Notice To Vendors

This Is Not An Order. It Is Merely A Request For Prices

THE UNIVERSITY OF LOUISIANA AT MONROE
Monroe, Louisiana
REQUEST FOR QUOTATION

AUXILIARY MAINTENANCE
Department

19-Apr-13

Date and Time by Which Quotation Must be Returned
02:00 PM, Central Time
MAY 16, 2013

TO THE VENDOR:

To be returned on or before date specified above to:

THE UNIVERSITY OF LOUISIANA AT MONROE
PURCHASING DEPARTMENT, COENEN HALL 140
700 UNIVERSITY AVE (Physical Address: 4014 LaSalle)
MONROE, LOUISIANA 71209-2250

Name and Address of Vendor (Firm or Individual), PLEASE COMPLETE BEFORE RETURNING

PURCHASE REQUISITION NO 219430 BID 50006-127 **P. O. No.**

NOTE: THE UNIVERSITY RESERVE THE RIGHT TO ACCEPT OR REJECT ANY OR ALL BIDS, AND WAIVE INFORMALITIES

THIS BID IS DUE IN PURCHASING OFFICE
AS STATED ABOVE
LATE BIDS NOT ACCEPTED

INSTRUCTIONS TO BIDDERS:

1. READ THE ENTIRE BID, INCLUDING ALL TERMS AND CONDITIONS AND SPECIFICATIONS.
2. ALL BID PRICES MUST BE TYPED OR WRITTEN IN INK. ANY CORRECTIONS, ERASURES OR OTHER FORMS OF ALTERATION TO UNIT PRICES SHOULD BE INITIALED BY THE BIDDER.
3. THIS BID IS TO BE MANUALLY SIGNED IN BLUE INK.
4. BID PRICES SHALL INCLUDE DELIVERY OF ALL ITEMS F.O.B. DESTINATION OR AS OTHERWISE PROVIDED. BIDS CONTAINING "PAYMENT IN ADVANCE" OR "C.O.D." REQUIREMENTS MAY BE REJECTED. PAYMENT IS TO BE MADE WITHIN 30 DAYS AFTER RECEIPT OF PROPERLY EXECUTED INVOICE OR
5. BIDS SUBMITTED ARE SUBJECT TO PROVISIONS OF THE LAWS OF THE STATE OF LOUISIANA INCLUDING BUT NOT LIMITED TO L.R.S. 39:1551-1736; PURCHASING RULES AND REGULATIONS; EXECUTIVE ORDERS; STANDARD TERMS AND CONDITIONS; SPECIAL CONDITIONS; AND SPECIFICATIONS LIST
6. SEALED BIDS MUST BE RECEIVED AT THE DATE AND TIME AS SPECIFIED ABOVE AND DELIVERED TO THE PURCHASING DEPARTMENT, COENEN HALL, ROOM 140, 700 UNIVERSITY AVE, MONROE LA 71209.
7. **TO ASSURE CONSIDERATION OF YOUR BID, ALL BIDS AND ADDENDA SHOULD BE RETURNED IN AN ENVELOPE OR PACKAGE CLEARLY MARKED WITH THE BID OPENING DATE AND THE BID NUMBER.**
8. ALL ITEMS WILL BE AWARDED TO ONE VENDOR WITH THE PROPER STATE OF LOUISIANA LICENSE.
9. NOTE: A COMPLETE RECORD OF ALL BIDS IS KEPT ON FILE IN THE PURCHASING DEPARTMENT SUBJECT TO THE INSPECTIONS OF ANY CITIZEN. EVERY COURTESY WILL BE AFFORDED ANY CITIZEN WHO IS INTERESTED IN INVESTIGATING FOR ANY PURPOSE THE RECORD OF STATE PURCHASES. **COPIES OF EVALUATION CAN BE FAXED TO YOU ONLY AFTER RECEIPT OF WRITTEN REQUEST. PLEASE DO NOT CALL**
10. IMPORTANT: BY SIGNING THE BID, THE BIDDER CERTIFIES COMPLIANCE WITH ALL INSTRUCTIONS TO BIDDERS, TERMS, CONDITIONS AND SPECIFICATIONS, AND FURTHER CERTIFIES THAT THIS BID IS MADE WITHOUT COLLUSION OR FRAUD. THIS BID IS TO BE MANUALLY SIGNED IN INK BY A PERSON AUTHORIZED TO BIND THE VENDOR. ALL BID INFORMATION SHALL BE MADE WITH INK OR TYPEWRITTEN.
11. ORDER OF PRIORITY. IN THE EVENT THERE IS A CONFLICT BETWEEN THE INSTRUCTIONS TO BIDDERS OR STANDARD CONDITIONS AND THE SPECIAL CONDITIONS, THE SPECIAL CONDITIONS SHALL GOVERN.

For questions regarding this bid, please contact Susie Clay at 318/342-5209.

TO THE VENDOR:

BID BOND OF 5% REQUIRED FOR THIS BID

_____BID BOND ATTACHED $

_____ CERTIFIED CHECK ATTACHED $

PERFORMANCE BOND WILL BE REQUIRED

LOUISIANA CONTRACTORS LICENSE #

RELEASE SOLICITION -05/9/2013
DEADLINE TO RECEIVE INQUIRIES - 04/23/2013

THIS QUOTATION IS SUBMITTED BY

Name of Vendor (Firm or Individual) _____

Signature _____

Name (Printed) _____

Telephone # _____

Fax # _____

Title _____

Quote # _____

Date Submitted _____

ADVERTISEMENT FOR BIDS

Sealed bids will be received for the State of Louisiana by the Purchasing Department of The University of Louisiana Monroe, Coenen Hall 140, 700 University Avenue, Monroe, LA 71209-2250 until 2:00 P.M., May 16, 2013.

ANY PERSON REQUIRING SPECIAL ACCOMMODATIONS SHALL NOTIFY THE PURCHASING DEPARTMENT OF THE TYPE(S) OF ACCOMMODATION REQUIRED NOT LESS THAN SEVEN (7) DAYS BEFORE THE BID OPENING.

For: Malone Stadium HVAC Project

Bid Number: 50006-127

Complete Bidding Documents may be obtained from: The Director of Purchasing, The University of Louisiana at Monroe, Monroe, Louisiana, 71209-2250, via fax request at 318 342 5218 or the State of Louisiana LaPac page: http://wwwprd1.doa.louisiana.gov/osp/lapac/pubmain.cfm by using Bid No.50006-127 .

All bids must be accompanied by bid security equal to five percent (5%) of the sum of the base bid and all alternates, and must be in the form of a certified check, cashier's check or Facility Planning and Control Bid Bond Form written by a surety company licensed to do business in Louisiana, signed by the surety's agency or attorney-in-fact. Surety must be listed on the current U.S. Department of the Treasury Financial Management Service list of approved bonding companies as approved for an amount equal to or greater than the amount for which it obligates itself in the Bond, or must be a Louisiana domiciled insurance company with at least an A- rating in the latest printing of the A.M. Best's Key Rating Guide. If surety qualifies by virtue of its Best's listing, the amount of the Bond may not exceed ten percent (10%) of policyholders' surplus as shown in the latest A.M. Best's Key Rating Guide. The Bid Bond shall be in favor of the State of Louisiana, Office of Facility Planning and Control, and shall be accompanied by appropriate power of attorney. No Bid Bond indicating an obligation of less than five percent (5%) by any method is acceptable.

The successful Bidder shall be required to furnish a Performance and Payment Bond written by a company licensed to do business in Louisiana, in an amount equal to 100% of the Contract amount. Surety must be listed currently on the U.S. Department of Treasury Financial Management Service List (Treasury List) as approved for an amount equal to or greater than the contract amount, or must be an insurance company domiciled in Louisiana or owned by Louisiana residents. If surety is qualified other than by listing on the Treasury list, the contract amount may not exceed fifteen percent of policyholders' surplus as shown by surety's most recent financial statements filed with the Louisiana Department of Insurance and may not exceed the amount of $500,000. However, a Louisiana domiciled insurance company with at least an A- rating in the latest printing of the A.M. Best's Key Rating Guide shall not be subject to the $500,000 limitation, provided that the contract amount does not exceed ten percent of policyholders' surplus as shown in the latest A.M. Best's Key Rating Guide nor fifteen percent of policyholders' surplus as shown by surety's most recent financial statements filed with the Louisiana Department of Insurance. The Bond shall be signed by the surety's agent or attorney-in-fact.

A pre-bid meeting will be held on Thursday, May 2, 2013 at 10:00 AM at Malone Football Stadium at the main entrance near the center of the building. Bids shall be accepted from Contractors who are licensed under LA. R.S. 37:2150-2192 in the areas of HVAC installation and repair. Bidder is required to comply with provisions and requirements of LA. R.S. 38:2212(A)(1)(c). No bid may be withdrawn for a period of thirty (30) days after receipt of bids, except under the provisions of LA. R.S. 38:2214.

The Owner reserves the right to reject any and all bids for just cause. In accordance with La. R.S. 38:2212(A)(1)(b), the provisions and requirements of this Section, those stated in the advertisement for bids, and those required on the bid form shall not be considered as informalities and shall not be waived by any public entity.

STATE OF LOUISIANA

THE UNIVERSITY OF LOUISIANA MONROE
MONROE, LOUISIANA
A Member of the University of Louisiana System

INVITATION TO BID
FOR
Malone Stadium HVAC Project
BID NO. 50006-127

ISSUING AGENCY:	The University of Louisiana Monroe Purchasing Department 700 University Avenue Monroe, LA 71209
DIRECTOR OF PURCHASING:	Larry Estess
PROCUREMENT MANAGER 1:	Susie Clay
Telephone:	318 342 5209
REQUISITIONED BY:	Jason Roubique
Telephone:	318 342 5171
RELEASE DATE:	April 22, 2013
BID OPENING DATE:	May 16, 2013
BID OPENING TIME:	2:00 p.m., Central Time
BID OPENING LOCATION:	The University of Louisiana Monroe Purchasing Department Coenen Hall 140 700 University Avenue Monroe, Louisiana

NOTE: THIS SOLICITATION IS A SEALED BID AND MUST BE RETURNED BY MAIL OR DELIVERED IN PERSON. BID RESPONSE FORMS CANNOT BE FAXED AND ANY FAX RESPONSES SHALL BE REJECTED.

This ITB is available in electronic form at http://wwwprd1.doa.louisiana.gov/osp/lapac/pubmain.cfm. It is in printed form by submitting a written request to the Procurement Manager listed above. It is the Bidder's responsibility to check the Office of State Purchasing LaPAC website frequently for any possible addenda that may be issued. ULM is not responsible for a bidder's failure to download any addenda documents required to complete an Invitation to Bid.

Definitions:

“Alternate” A specified item of construction that is set apart by a separate sum. An alternate may or may not be incorporated into the contract sum at the discretion of the owner at the time of contract award.

“Base Bid” The amount of money stated in the bid as the sum for which the bidder offers to perform the work described in the bidding documents, prior to the adjustments for alternate bids but including any unit prices.

“Bid” A complete signed proposal to perform work or a designated portion for a stipulated sum. A bid is submitted in accordance with the bidding documents, is evaluated on price alone and is not subject to qualification.

“Bidder” An entity or person who submits a bid for a prime contract with the owner. A bidder is not a contractor on a specific project until a contract is signed between the bidder and the owner.

“Bid Form” A form provided to the bidder on which to submit his bid.

“Bid Security” A bid bond or deposit submitted with a bid to guarantee to the owner that the bidder, if awarded the contract, will execute the contract within a specified period of time and will furnish any bonds or other requirements of the bidding documents.

“Bidding Documents” Documents usually including advertisement, bid notice or invitation to bidders, instructions to bidders, bid form, form of contract, forms of bonds, conditions of contract, drawings, specifications addenda, special provisions, and all other written instruments prepared by or on behalf of a public entity for use by prospective bidders on a public contract.

“Owner” The public entity issuing the bid.

"Public entity" means and includes the state of Louisiana, or any agency, board, commission, department, or public corporation of the state, created by the constitution or statute or pursuant thereto, or any political subdivision of the state, including but not limited to any political subdivision as defined in Article VI Section 44 of the Constitution of Louisiana, and any public housing authority, public school board, or any public officer whether or not an officer of a public corporation or political subdivision. "Public entity" shall not include a public body or officer where the particular transaction of the public body or officer is governed by the provisions of the model procurement code.

"Public work" Means the erection, construction, alteration, improvement, or repair of any public facility or immovable property owned, used, or leased by a public entity.

“Unit Price” The amount stated in a project bid representing the price per unit of materials and/or services.

Combined Recommended Language for Invitations to Bid (ITB)
Veteran-Owned and Service-Connected Disabled Veteran-Owned (Veteran Initiative) and
Louisiana Initiative for Small Entrepreneurships (Hudson Initiative) Program

This procurement has been designated as suitable for Louisiana certified small entrepreneurships participation.

The State of Louisiana Veteran and Hudson Initiatives small entrepreneurship programs are designed to provide additional opportunities for Louisiana-based small entrepreneurships (sometimes referred to as LaVet's and SE's respectively) to participate in contracting and procurement with the state. A certified Veteran-Owned and Service-Connected Disabled Veteran-Owned small entrepreneurship (LaVet) and a Louisiana Initiative for Small Entrepreneurships (Hudson Initiative) are businesses that have been certified by the Louisiana Department of Economic Development. All eligible vendors are encouraged to become certified. Qualification requirements and online certification are available at https://smallbiz.louisianaforward.com/index_2.asp.

Bidders that are not eligible for certification are encouraged to use Veteran-Owned and Service-Connected Disabled Veteran-Owned and Hudson Initiative small entrepreneurships where sub-contracting opportunities exist. To be responsive to this solicitation, the bidder shall be either a Veteran-Owned or Service-Connected Disabled Veteran-Owned or Hudson Initiative small entrepreneurship or have put forth a good-faith effort to use certified Veteran-Owned or Service-Connected Disabled Veteran-Owned and Hudson Initiative small entrepreneurships as sub-contractors(s). By signing and submitting this bid, the bidder certifies compliance with this requirement.

For a good faith effort, written notification is the preferred method to inform Louisiana certified Veteran Initiative and Hudson Initiative small entrepreneurships of potential subcontracting opportunities. A current list of certified Veteran-Owned and Service-Connected Disabled Veteran-Owned and Hudson Initiative small entrepreneurships may be obtained from the Louisiana Economic Development Certification System at https://smallbiz.louisianaforward.com/index_2.asp. Additionally, a current list of Hudson Initiative small entrepreneurships, which have been certified by the Louisiana Department of Economic Development and have opted to enroll in the State of Louisiana Procurement and Contract (LaPAC) Network, may be accessed from http://wwwprd.doa.louisiana.gov/osp/lapac/Vendor/srchven.asp. You may then determine the search criteria (i.e. alphabetized list of all certified vendors, by commodities, etc.), and select "SmallE".

Copies of notification to at least three (or more) certified Veteran Initiative and Hudson Initiative small entrepreneurships will satisfy the notification requirements. Notification must be provided to the certified entrepreneurships by the bidder in writing no less than five working days prior to the date of bid opening. Notification must include the scope of work, location to review plans and specifications (if applicable), information about required qualifications and specifications, any bonding and insurance information and/or requirements (if applicable), and the name of a person to contact. If a certified Veteran-Owned or Service-Connected Disabled Veteran-Owned or Hudson Initiative small entrepreneurship was not selected, the bidder must certify and maintain written justification of the selection process. The state reserves the right to request confirmation of this information at any time.

In the event questions arise after an award is made relative to the bidder's good faith efforts, the bidder will be required to provide supporting documentation to demonstrate its good faith subcontracting plan was actually followed. If it is at any time determined that the contractor did not in fact perform its good faith subcontracting plan, the contract award or the existing contract may be terminated.

Contractors will be required to report Veteran-Owned and Service-Connected Disabled Veteran-Owned and Hudson Initiative small entrepreneurship subcontractor or distributor participation and the dollar amount of each. *(Agencies should indicate their specific requirement, i.e. where to send information and when - with bid, after clear lien, etc.)*

The statutes (R.S 39:2171 *et. seq.*) concerning the Veteran Initiative may be viewed at http://www.legis.state.la.us/lss/lss.asp?doc=671504; and the statutes (R.S 39:2001 *et. seq.)* concerning the Hudson Initiative may be viewed at http://www.legis.state.la.us/lss/lss.asp?doc=96265. The rules for the Veteran Initiative (LAC 19:VII.Chapters 11 and 15) and for the Hudson Initiative (LAC 19:VIII.Chapters 11 and 13) may be viewed at http://www.doa.louisiana.gov/osp/se/se.htm.

The State requires competitive pricing, qualifications, and demonstrated competencies in the selection of contractors.

If you are a Certified Small Entrepreneur (Hudson Initiative), Veteran Owned Small Entrepreneurs, or Service-Connected Disabled Veteran-Owned (Veteran Initiative) vendor, please state your Certification Number below.

Certification No./date of certification.: _____

LOUISIANA UNIFORM PUBLIC WORK BID FORM

TO: The University of LA Monroe
700 University Avenue
Coenen Hall 140
Monroe LA 71209-2250

BID FOR: Malone Stadium HVAC Project
Bid No. 50006-127

The undersigned bidder hereby declares and represents that she/he; a) has carefully examined and understands the Bidding Documents, b) has not received, relied on, or based his bid on any verbal instructions contrary to the Bidding Documents or any addenda, c) has personally inspected and is familiar with the project site, and hereby proposes to provide all labor, materials, tools, appliances and facilities as required to perform, in a workmanlike manner, all work and services for the construction and completion of the referenced project, all in strict accordance with the Bidding Documents prepared by: The University of Louisiana at Monroe/John Guth & Associates and dated: March 14, 2013 & April 22, 2013

Bidders must acknowledge all addenda. The Bidder acknowledges receipt of the following **ADDENDA**:

No. ____ Dated: _____ No. ____ Dated: _____ No. ____ Dated: _____

No. ____ Dated: _____ No. ____ Dated: _____ No. ____ Dated: _____

BASE BID: For all work required by the Bidding Documents for the MALONE STADIUM HVAC PROJECT we bid the sum of:

_____ Dollars ($_____)

Add Alternate 1 – Replacement of Cooling Tower #1 and Condenser Water Pump 1A - we bid the sum of:

_____ Dollars ($_____)

Add Alternate 2 - Provide and Install Variable Frequency Drive for Cooling Tower #1 - we bid the sum of:

_____ Dollars ($_____)

Add Alternate 3 - Provide and Install Condenser Water Pump 1B - we bid the sum of:

_____ Dollars ($_____)

NAME OF FIRM OR JOINT VENTURE: _____

ADDRESS OF BIDDER: _____

_____

LOUISIANA CONTRACTOR'S LICENSE NUMBER: _____

NAME OF AUTHORIZED SIGNATORY OF BIDDER: _____

TITLE OF AUTHORIZED SIGNATORY OF BIDDER: _____

AUTHORIZED SIGNATURE OF BIDDER *: _____

DATED: _____

* If someone other than a corporate officer signs for the Bidder/Contractor, a copy of a corporate resolution or other signature authorization shall be required for submission of bid. Failure to include a copy of the appropriate signature authorization, if required, may result in the rejection of the bid unless bidder has complied with La. R.S. 38:2212(A)(1)(c) or RS 38:2212(O) .

BID SECURITY in the form of a bid bond, certified check or cashier's check as prescribed by LA RS 38:2218.A is attached to and made a part of this bid. If a bid bond is provided it shall be on the attached form and only on the attached form.

BID BOND
FOR
Malone Stadium HVAC Project

Date: _____

KNOW ALL MEN BY THESE PRESENTS:

That_____of_____, as Principal, and , as Surety, are held and firmly bound unto the _____ (Obligee), in the full and just sum of five (5%) percent of the total amount of this bid, including all alternates, lawful money of the United States, for payment of which sum, well and truly be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally firmly by these presents.

Surety represents that it is listed on the current U. S. Department of the Treasury Financial Management Service list of approved bonding companies as approved for an amount equal to or greater that the amount for which it obligates itself in this instrument or that it is a Louisiana domiciled insurance company with at least an A - rating in the latest printing of the A. M. Best's Key Rating Guide. If surety qualifies by virtue of its Best's listing, the Bond amount may not exceed ten percent of policyholders' surplus as shown in the latest A. M. Best's Key Rating Guide.

Surety further represents that it is licensed to do business in the State of Louisiana and that this Bond is signed by surety's agent or attorney-in-fact. This Bid Bond is accompanied by appropriate power of attorney.

THE CONDITION OF THIS OBLIGATION IS SUCH that, whereas said Principal is herewith submitting its proposal to the Obligee on a Contract for:

_____

NOW, THEREFORE, if the said Contract be awarded to the Principal and the Principal shall, within such time as may be specified, enter into the Contract in writing and give a good and sufficient bond to secure the performance of the terms and conditions of the Contract with surety acceptable to the Obligee, then this obligation shall be void; otherwise this obligation shall become due and payable.

_____	_____
PRINCIPAL (BIDDER)	SURETY
BY: _____	BY: _____
AUTHORIZED OFFICER-OWNER-PARTNER	AGENT OR ATTORNEY-IN-FACT(SEAL)

INDEMNIFICATION AGREEMENT

The _____ (Contractor) agrees to protect, defend, indemnify, save, and hold harmless the State of Louisiana, all State Departments, Agencies, Boards and Commissions, its officers, agents, servants and employees, including volunteers, from and against any and all claims, demands, expense and liability arising out of injury or death to any person or the damage, loss or destruction of any property which may occur or in any way grow out of any act or omission of _____(Contractor), its agents, servants, and employees, or any and all costs, expense and/or attorney fees incurred by _____(Contractor) as a result of any claim, demands, and/or causes of action except those claims, demands, and/or causes of action arising out of the negligence of the State of Louisiana, all State Departments, Agencies, Boards, Commissions, its agents, representatives, and/or employees. _____ (Contractor) agrees to investigate, handle, respond to, provide defense for and defend any such claims, demand, or suit at its sole expense and agrees to bear all other costs and expenses related thereto, even if it (claims, etc.) is groundless, false or fraudulent.

Accepted by _____
Company Name

_____
Signature

_____
Title

Date Accepted _____

Is Certificate of Insurance Attached? _____ Yes _____No

Contract No. __50006-127_____ For: The University of Louisiana at Monroe

Purpose of Contract: Malone Stadium HVAC Project_____

LIQUIDATED DAMAGES:

The undersigned agrees that the Owner may retain the sum of Two hundred and fifty dollars($250) from the amount of the Compensation to be paid him for each day after the above stated completion date, Sundays and Holidays included, that the work remains incomplete. This amount is agreed upon as the proper measure of Liquidated Damages which the Owner will sustain per day by the failure of the undersigned to complete the work at the stipulated time and is not to be construed in any sense as a penalty.

If this proposal shall be accepted and the undersigned shall fail to execute the contract and furnish performance bond as herein provided, then the proposal guarantee shall become the property of the University; otherwise, the said proposal guaranty shall be returned to the undersigned.

Bidder certifies that he has visited the job site at The University of Louisiana at Monroe, and is fully aware of what is expected of the successful bidder (s).

_____
Louisiana Contractor's License Number

_____
Firm Name`

_____
Authorized Signature

_____
Title

_____
Phone/Fax Numbers

_____
Date

STATE OF LOUISIANA NAME _____

PARISH OF OUACHITA LOCATION _____

AFFIDAVIT

Before me, the undersigned authority, duly commissioned and qualified within and for the state and parish aforesaid, personally came and appeared _____representing _____ who, being by me first duly sworn deposed and said that he has read this affidavit and does hereby agree under oath to comply with all provisions herein as follows:

PART I

Section 2220 of Part II of Chapter 10 to Title 38 of the Louisiana Revised Statutes of 1950 as amended.

(1) That affiant employed no person, corporation, firm, association, or other organization, either directly or indirectly, to secure the public contract under which he received payment, other than persons regularly employed by the affiant whose services in connection with the construction of the public building or project or in securing the public contract were in the regular course of their duties for affiant; and

(2) That no part of the contract price received by affiant was paid or will be paid to any person, corporation, firm, association, or other organization for soliciting the contract, other than the payment of their normal compensation to persons regularly employed by the affiant whose services in connection with the construction of the public building or project were in the regular course of their duties for affiant.

PART II

Section 2190 of Part I of Chapter 10 of Title 38 of the Louisiana Revised Statutes of 1950 as amended.

The affiant, if he be an architect or engineer, or representative thereof, does not own a substantial financial interest, either directly or indirectly, in any corporation, firm, partnership, or other organization which supplied materials for the construction of a public building or project when the architect or engineer has performed architectural or engineering services, either directly or indirectly, in connection with the public building or project for which the materials are being supplied.

For the purpose of this Section, a "substantial financial interest" shall exclude any interest in stock being traded on the American Stock Exchange or the New York Stock Exchange.

That affiant, if subject to the provisions of this section, does hereby agree to be subject to the penalties involved for the violation of this section.

PART III

That affiant does hereby state that he has read and agrees to comply with and be subject to the provisions of Part V of Chapter 10 of Title 38 of the Louisiana Revised Statutes of 1950, being Sections 2290 through 2296 of Title 38 as amended.

Signature of Affiant: _____

SWORN TO AND SUBSCRIBED BEFORE ME THIS _____ DAY OF _____, 201___.

Signature of Notary: _____

The University of Louisiana at Monroe

Monroe, Louisiana

This Agreement, made and executed, on this _____ day of the month _____ in the year of our Lord, TWO THOUSAND and THIRTEEN, by and through _____, The University of Louisiana at Monroe, the Party of the First Part, and hereinafter designated as "University" and _____, Contractor, domiciled and doing business in _____, Party of the Second Part, and hereinafter designated as Contractor.

WITNESSETH, That, in consideration of the covenants and agreements herein contained to be performed by the parties hereto and of the payments hereinafter agreed to be made, it is mutually agreed as follows:

The Contractor shall and will provide and furnish all materials, equipment and labor and perform the work required to complete in a thorough and workmanlike manner, to the satisfaction of the University, project entitled Malone Stadium HVAC Project, in strict accordance with the Plans and Specifications which are on file in the Purchasing Department at The University of Louisiana at Monroe. The bid on this project, numbered 50006-127, was opened on _____, at . The plans and specifications and the Proposal Form are made a part hereof as fully as if set out herein and hereby become a part of this contract. Contract amount is $_____.

It is agreed and understood between the parties hereto that the Contractor agrees to accept and the University agrees to pay for the work at the price stipulated in said Proposal, such payment to be in lawful money of the United States, and the payment shall be made at the time and the manner set forth.

Performance will begin _____

The University of Louisiana at Monroe

BY: _____

TITLE: _____

_____

BY: _____

TITLE: _____

INSTRUCTIONS TO BIDDERS

ARTICLE 1

DEFINITIONS

1.1 The Bidding Documents include the following:

1. Advertisement for Bids.
2. Instructions to Bidders.
3. Bid Form
4. Contract between Owner and Contractor.
5. Performance and Payment Bond.
6. Affidavit of Compliance with Act 38, 1965 Louisiana State Legislature.
7. General Conditions of the Contract for Malone Stadium HVAC Project
8. Supplementary (and amended General) Conditions.
9. Divisions of the Technical Specifications.
10. Addenda issued during bid period. (by Owner and acknowledged in bid form)

1.2 Addenda are written or graphic instruments issued prior to the execution of the Contract which modify or interpret the bidding documents, including Drawings and Specifications, by additions, deletions, clarifications or corrections. Addenda will become part of the Contract Documents when the Contract is executed.

ARTICLE 2

BIDDER'S REPRESENTATION

2.1 Each bidder by submitting a bid represents that s/he has read and understands the bidding documents.

2.2 Each bidder by making a bid represents that s/he has visited the site and familiarized themselves with the local conditions under which the work is to be performed.

2.3 Each bidder by submitting a bid understands they must be fully qualified under any state or local licensing law for Contractors in effect at the time and at the location of the project before submitting a bid. In the State of Louisiana; only the bids of contractors and sub-contractors duly licensed under Louisiana Revised Statute 37:2150, et. seq., will be considered, if applicable. The Contractor shall be responsible for ensuring all Sub-contractors or prospective Sub-contractors are duly licensed in accordance with the statute above.

2.4 Each bidder submitting a bid understands that ULM’s Public Works Policy related to contractor licensure is that a contractor’s license is required for any/all projects with an anticipated/bid cost greater than $50,000

ARTICLE 3

BIDDING PROCEDURES

3.1 Bids must be prepared on the forms provided by the Owner and submitted in accordance with the Instructions to Bidders.

3.2 A bid will be considered invalid if not deposited at the designated location prior to the time and date for receipt of bids indicated in the advertisement or invitation to bid, or prior to any extension thereof issued to the bidders.

3.3 Unless otherwise provided in any supplement to these Instructions to Bidders, no bidder shall modify, withdraw or cancel his bid or any part thereof for thirty days after the receipt of bids. However, written request (letter or telegram) for the withdrawal of a bid or any part thereof will be granted if the request is received prior to the specified time of opening. Formal bids, amendments thereto or request for withdrawal of bids or any part thereof received after time specified for bid opening will not be considered whether delayed in the mail or for any other cause whatsoever.

3.4 Bids are to be sealed and will be received until the time specified and at the place specified in the advertisement for bids. It shall be the specific responsibility of the Bidders to deliver sealed bids to The University of Louisiana at Monroe at the appointed place and prior to the announced time for the opening of bids. Late delivery of a bid for any reason including late delivery by the United States Mail shall disqualify the bid.

3.5 Prior to the receipt of bids, Addenda, if any, will be mailed or delivered (hard copy or email) to each person or firm recorded by the Owner as having received the bidding documents and will be available for inspection wherever the bidding documents are kept available for that purpose. Addenda issued after receipt of bids will be mailed or delivered only to the sealed bidder.

3.6 **Bids for Public Works will not be considered or accepted unless the bid is accompanied by bid security in an amount of not less than five percent (5%) of the sum of the Base Bid and any Alternates.** The bid security shall be in the form of a certified check drawn on a bank insured by the Federal Deposit Insurance Corporation, or a bid bond written by a surety company licensed to do business in Louisiana, accompanied by appropriate power of attorney and in favor of The University of Louisiana at Monroe.

3.7 All Bids and Sureties must be signed by a duly authorized person of the firm or corporation and be accompanied by legal evidence authorizing the signature as valid.

3.8 Any interpretation, correction or change of the Bidding Documents will be made by Addendum. Interpretations, corrections or changes of the Bidding Documents made in any other manner will not be binding, and bidders shall not rely upon such interpretations, corrections and changes.

3.9 If bidding other than as specified, an indication must be made on the bid form, stating manufacturer's name and model number(s) being submitted for bid. Detailed specifications, drawings, pictures, brochures, diagrams or any other literature or information necessary to determine the equality of the bid response must be included with the bid form.

3.10 Prior to the issuance of a purchase order the successful bidder must submit the following items to the Purchasing Department:

a. Notarized affidavit
b. Contract
c. Insurance Certificate
d. Proof of filing of Performance and Payment Bond with Power of Attorney, if Public Works, and,
e. Resolution, if incorporated.

ARTICLE 4

EXAMINATION OF BIDDING DOCUMENTS

4.1 Each bidder shall examine the bidding documents carefully and, not later than seven days prior to the date for receipt of bids, shall make written request to the Owner for interpretation or correction of any ambiguity, inconsistency or error therein which he may discover. Any interpretation or correction will be issued as an Addendum by the Owner. Only a written interpretation or correction by Addendum shall be binding. No bidder shall rely upon any interpretation or correction given by any other method.

ARTICLE 5

SUBSTITUTIONS

5.1 Each bidder represents that his bid is based upon the materials and equipment described in the bidding documents.

MANUFACTURER'S NUMBERS OR TRADE NAMES:

5.2 Where a manufacturer's product is named or specified, it is understood that "or equal" shall apply, whether stated or not. Such name and number is meant to establish the standard of quality desired and does not restrict bidders to the specific brand, make, manufacturer, or specification named; and are set forth and convey to prospective bidders the general style, type, character, and quality of product desired; and that equal products will be acceptable. The University of Louisiana at Monroe shall be sole judge as to whether or not the material is equal to that specified.

ARTICLE 6

REJECTION OF BIDS

6.1 The bidder acknowledges the right of the Owner to reject any or all bids and to waive any informality or irregularity in any bid received. In addition, the bidder recognizes the right of the Owner to reject a bid if the bidder failed to furnish any required bid security, or to submit the data required by the bidding documents, or if the bid is in any way incomplete or irregular.

ARTICLE 7

AWARDS

7.1 Awards may not be made to any person, firm, or company in default of any contract. Said person, firm, or company shall be considered non-responsible bidders and may be reinstated and awards made to them only after they have given evidence of good faith and have satisfactorily completed their obligations.

PUBLICIZING AWARDS

7.2 Written notice of award shall be sent to the successful bidder. In procurement over $25,000, each unsuccessful bidder shall be notified of the award provided that he/she submitted with his/her bid a self-addressed envelope requesting this information. Notice of award will be made a part of the procurement file.

RIGHT TO PROTEST

7.3 Any person who is aggrieved in connection with the solicitation or award of a contract shall protest to the Director Purchasing. Protests with respect to a solicitation shall be submitted in writing at least two days prior to the opening of bids on all matters except housing of state agencies, their personnel, operations, equipment, or activities pursuant to R.S. 39:1643 for which such protest shall be submitted at least ten days prior to the opening of bids. Protests with respect to the award of a contract shall b submitted in writing within fourteen days after contract award.

AUTHORITY TO RESOLVE PROTESTS:

7.4 Prior to the commencement of an action in court concerning any controversy, the Director of Purchasing or his designee shall have the authority, to resolve the protest of any aggrieved person concerning the solicitation or award of a contract. This authority shall be exercised in accordance with regulations.

ARTICLE 8

PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND

8.1 Performance and Payment Bonds shall be required on Public Works projects with an expected cost greater than $50,000. Performance and Payment Bonds, when required, shall be provided in an amount of 100% of the contract price. Performance and Payments Bonds shall be required by the successful bidder. Any surety bond required shall be written by a surety or insurance company currently on the U. S. Department of the Treasury Financial Management Service list of approved bonding companies which is published annually in the Federal Register. For any Public Works projects, no surety or insurance company shall write a bond which is in excess of the amount indicated as approved by the U. S. Department of the Treasury Financial Management Service list. The surety bond written for a Public Works project shall be written by a surety or insurance company that is currently licensed to do business in the State of Louisiana.

8.2 The bidder shall require the attorney in fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of his power of attorney indicating the monetary limit of such power.

RECORDING OF BOND AND CONTRACT

8.3 The Contractor shall record the Contract and Performance Bond with the Clerk of Court in Ouachita Parish and provide the Purchasing Department with proof of filing.

ARTICLE 9

PAYMENT

9.1 Payment will be made by The University of Louisiana Monroe.

9.2 The contractor will be required to provide a Clear Lien Certificate from the Ouachita Parish Clerk of Court, a process that may take an average 45 days for final payment.

ARTICLE 10

TAXES

10.1 Applicable taxes are to be included in lump sum bid.

ARTICLE 11

GUARANTEE

11.1 The materials and labor under this contract, as described in the specifications, shall be guaranteed by the Contractor for a period of one year from date of its acceptance against defects of materials or workmanship. Any defects which develop during this period shall be properly repaired or replaced without cost to the Owner as soon as possible.

ACCEPTANCE

11.2 The guarantee covering materials and labor under this contract will begin the date a Notice of Acceptance is issued to the Contractor by The University of Louisiana at Monroe.

ARTICLE 12

CHANGES IN THE WORK

12.1 A Change Order is a written order to the Contractor signed by the Owner, issued after execution of the Contract, authorizing a Change in the Work or an adjustment in the Contract Sum or the Contract Time. The Contract Sum and the Contract Time may be changed only by Change Order. A Change Order signed by the Contractor indicates his agreement therewith, including the adjustment in the Contract Sum or the Contract Time. Any Change Order not signed by the Owner will be considered null and void.

12.2 The Owner, without invalidating the Contract, may order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and the Contract Time being adjusted accordingly. All such changes in the Work shall be authorized by Change Order, and shall be performed under the applicable conditions of the Contract Documents.

12.3 Any change order in excess of the contract limit as defined herein shall be let out for public bid. The term contract limit as used herein shall be equal to the sum of $30,000 per project. When the Change Order is negotiated it shall be fully documented and itemized as to cost, including material quantities, material costs, insurance, employee benefits, other related costs, profit and overhead. Where certain unit prices are contained in the initial contract no deviation shall be allowed in computing negotiated change order cost.

SUPPLEMENTARY CONDITIONS

ARTICLE 1

CONTRACTOR

CONTRACTOR'S LICENSE

1.1 On any bid amounting to $50,000 or more, the Contractor shall certify that s/he is licensed under Act 377 of the 1976 Louisiana Regular Legislative Session and show the contractor license number and the bid number on the front portion of the envelope; except projects financed, partially or wholly, with Federal Funds, provided that any successful Bidder before signing Contract thereon, files application for a license and pays the fee as provided in this Act and complies with all terms and provisions of this Act and with the rules and regulations of the Licensing Board.

CONTRACTOR'S AFFIDAVIT

1.2 In accordance with the Louisiana R.S. 38:2190 - 2220, if the Contract is awarded to the successful Bidder, the bidder shall, at the time of the signing of the Contract, execute the AFFIDAVIT included in the Contract Documents.

INTEREST

1.3 There shall be no payment of interest on money owed.

ARTICLE 2

PAYMENTS AND COMPLETION

SUBSTANTIAL COMPLETION

2.1 The Owner will issue a NOTICE OF ACCEPTANCE for the Contractor to record with the Clerk of Court in Ouachita Parish.

FINAL COMPLETION AND FINAL PAYMENT

2.2 The Contract is to provide that the contractor is not to be paid more than ninety percent (90%) of the amount of the contract upon completion of the work. The Contractor shall record the NOTICE OF ACCEPTANCE with the Ouachita Parish Clerk of Court and shall furnish a CLEAR LIEN CERTIFICATE from the Clerk of Court within forty-five days after recordation of NOTICE OF ACCEPTANCE. At that time, the remaining ten percent (10%) will be paid.

LIQUIDATED DAMAGES

2.3 The Owner will suffer financial loss if the Project is not substantially complete on the date set forth in the CONTRACT DOCUMENTS. The Contractor (and/or Surety) shall be liable for and shall pay to the Owner Liquidated Damages for each calendar day of delay until the work is Substantially Complete.

The Completion Time stated in Consecutive Calendar Days and the Liquidated Damages stated in Dollars Per Day are listed in the specifications.

ARTICLE 3

INSURANCE

INSURANCE: Contractor shall procure and maintain for the duration of the contract insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work hereunder by the Contractor, his agents, representatives, employees or subcontractors. **The cost of such insurance shall be included in the Contractor's bid**.

A. MINIMUM SCOPE OF INSURANCE

Coverage shall be at least as broad as:

1. Insurance Services Office form number GL 0002 (Ed. 1/73) covering Comprehensive General Liability and Insurance Services Office form number GL 0404 covering Broad Form Comprehensive General Liability; or Insurance Services Office Commercial General Liability coverage ("occurrence" form CG 0001). **"Claims Made" form is unacceptable. The "occurrence form" shall not have a "sunset clause."**

2. Insurance Services Office form number CA 0001 (Ed. 1/78) covering Automobile Liability and endorsement CA 0025 or CA 0001 12 90. The policy shall provide coverage for owned, hired, and non-owned coverage. If an automobile is to be utilized in the execution of this contract, and the vendor/contractor does not own a vehicle, then proof of hired and non-owned coverage is sufficient.

3. Workers' Compensation insurance as required by the Labor Code of the State of Louisiana, including Employers Liability insurance.

B. MINIMUM LIMITS OF INSURANCE

Contractor shall maintain limits no less than:

1. Commercial General Liability: $1,000,000 combined single limit per occurrence for bodily injury, personal injury and property damage.

2. Automobile Liability: $1,000,000 combined single limit per accident, for bodily injury and property damage.

3. Workers Compensation and Employers Liability: Workers' Compensation limits as required by the Labor Code of the State of Louisiana and Employers Liability coverage.

C. BUILDER'S RISK COVERAGE

A General Contractor shall purchase and maintain property insurance upon the entire work included in the contract for an amount equal to the greater of the full-completed value or the amount of the construction contract including any amendments thereto. The general contractor's policy shall provide "ALL RISK" Builder's Risk Insurance (extended to include the perils of wind, collapse, vandalism/malicious mischief, and theft, including theft of materials whether or not attached to any structure.) The "ALL RISK" Builder's Risk Insurance must also cover architects' and engineers' fees that may be necessary to provide plans and specifications and supervision of work for the repair and/or replacement of property damage caused by a covered peril not to exceed 10% of the cost of those repair and/or replacements.

Flood coverage shall be provided by the Contractor on the first floor and below for projects North of the Interstate Corridor beginning at the Texas-Louisiana border at Interstate 10 East to the Baton Rouge junction of Interstate 12, East to Slidell junction with Interstate 10 to Louisiana-Mississippi border. Flood sub-limit shall equal an amount no lower than ten percent (10%) of the total contract cost per occurrence. Coverage for roofing projects shall not require flood coverage.

On projects South of this corridor, flood coverage shall be provided by the State of Louisiana, as the owner, through the National Flood Insurance Program (NFIP). The Contractor will be liable for the $5,000 deductible on the NFIP policy from the Notice to Proceed date through the Notice of Final Acceptance date of the project.

A specialty contractor shall purchase and maintain property insurance upon the system to be installed for an amount equal to the greater of the full-completed value or the amount of the contract including any amendments thereto. The specialty contractor may provide an installation floater with the same coverage as the "ALL RISK" Builder's Risk Insurance policy.

The policy must include the interest of the Owner, Contractor and Subcontractors as their interest may appear. The contractor has the right to purchase coverage or self-insure any exposures not required by the bid specifications, but shall be held liable for all losses, deductibles, self-insurance for coverages not required.

Policies insuring projects involving additions, alterations or repairs to existing buildings or structures must include and endorsement providing the following:

In the event of a disagreement regarding a loss covered by this policy which may also be covered by the State of Louisiana policy of self-insurance or any commercial property insurance policy purchased by the State of Louisiana, Office of Risk Management (ORM) covering in excess of the State of Louisiana, policy of self-insurance, this company agrees to follow the following procedure to establish coverage and/or the amount of loss:

Any party to a loss may make written demand for an appraisal of the matter in disagreement. Within 20 days of receipt of written demand, this company and either ORM or its commercial insurance company shall each select a competent and impartial appraiser and notify the other of the appraiser selected. The two appraisers will select a competent and impartial umpire. The appraisers will then identify the policy or policies under which the loss is insured and, if necessary, state separately the value of the property and the amount of the loss that must be borne by each policy. If the two appraisers fail to agree, they shall submit their differences to the umpire. A written decision by any two shall determine the policy or policies and the amount of the loss. Each insurance company (or ORM) agree that the decision of the appraisers and the umpire if involved, will be binding and final and that neither party will resort to litigation. Each of the two parties shall pay its chosen appraiser and bear the cost of the umpire equally.

D. DEDUCTIBLES AND SELF-INSURED RETENTIONS

Any deductibles or self-insured retentions must be declared to and approved by the Agency. At the option of the Agency, either: the insurer shall reduce or eliminate such deductibles or self-insured retentions as respects the Agency, its officers, officials, employees and volunteers; or the Contractor shall procure a bond guaranteeing payment of losses and related investigations, claim administration and defense expenses.

E. OTHER INSURANCE PROVISIONS

The policies are to contain, or be endorsed to contain, the following provisions:

1. General Liability and Automobile Liability Coverage

   a. The Agency, its officers, officials, employees, Boards and Commissions and volunteers are to be added as "additional insured" as respects liability arising out of activities performed by or on behalf of the Contractor; products and completed operations of the Contractor, premises owned, occupied or used by the Contractor. The coverage shall contain no special limitations on the scope of protection afforded to the Agency, its officers, officials, employees or volunteers. It is understood that the business auto policy under "Who is an insured" automatically provides liability coverage in favor of The University of Louisiana at Monroe and State of Louisiana.

   b. Any failure to comply with reporting provisions of the policy shall not affect coverage provided to the Agency, its officers, officials, and employees, Boards and Commissions or volunteers.

   c. The Contractor's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

2. Workers' Compensation and Employers Liability Coverage

   The insurer shall agree to waive all rights of subrogation against the Agency, its officers, officials, employees and volunteers for losses arising from work performed by the Contractor for the Agency.

3. All Coverage

   Each insurance policy required by this clause shall be endorsed to state that coverage shall not be suspended, voided, canceled by either party, or reduced in coverage or in limits except after thirty (30) days' prior written notice by certified mail, return receipt requested, has been given to the Agency.

F. ACCEPTABILITY OF INSURERS

Insurance is to be placed with insurers with an A.M. Best's rating of **"A- VI or higher"**. This requirement will be waived for workers' compensation coverage only for those contractors whose workers' compensation coverage is

placed with companies who participate in the State of Louisiana Workers' Compensation Assigned Risk Pool or the Louisiana Workers' Compensation Corporation.

G. VERIFICATION OF COVERAGE

Contractor shall furnish the Agency with certificates of insurance affecting coverage required by this clause. The certificates for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf. The certificates are to be received and approved by The University of Louisiana at Monroe before work commences. The University of Louisiana at Monroe reserves the right to require complete, certified copies of all required insurance policies, at any time.

H. SUBCONTRACTORS

Contractor shall include all subcontractors as insured under its policies or shall furnish separate certificates for each subcontractor. All coverage for subcontractors shall be subject to all of the requirements stated herein.

ARTICLE 4

QUALITY

STANDARD OF QUALITY

1.1 Where catalog numbers and/or manufacturer's names are referred to in the specifications, they are used for the purpose of conveying to the prospective bidders the type and design of equipment, or supplies desired; but it shall be understood that bidders may submit on other makes in lieu of that mentioned, providing such other item is similar in design and equal in quality. It is not expected that the items of all manufacturers shall conform exactly to every detail and dimension mentioned in the specifications; but the essential features of the items mentioned shall be provided in the items to be furnished.

University of Louisiana at Monroe (ULM)

Bid Specifications for Malone Stadium HVAC Project

1. PROJECT SUMMARY

The University of Louisiana at Monroe (ULM) is requesting bids from qualified, Louisiana licensed contractors. The scope of work mainly involves the installation of new HVAC equipment for the Malone Football Stadium.

2. PROJECT LOCATION

Malone Football Stadium is an athletic facility located on the main campus of the University of Louisiana at Monroe. Malone Football Stadium is located at 308 Warhawk Way, Monroe, LA 71209.

3. CONSTRUCTION PLANS & SPECIFICATIONS

All work shall be completed in strict accordance with the plans and specifications prepared by the engineer. These plans and specifications are included below. The engineer's contact information is below:

John Wilson, P.E.
John J. Guth and Associates, Inc.
208 Milam Street
Shreveport, Louisiana 71101
(318) 221-8638
(318) 221-8717 (fax)
jwilson@guthassoc.com

4. SITE VISITS / VERIFY EXISTING CONDITIONS

Any contractor submitting a bid for this project shall visit the project site in person prior to submitting a bid. Site visits can be coordinated by contacting Tim Brown, ULM Maintenance Director at 318-342-5190.

5. PRE-BID MEETING

There will be a pre-bid meeting held on Thursday, May 2, 2013 at 10:00 AM. The meeting will be held at Malone Football Stadium at the main entrance near the center of the building. Attendance is not mandatory; however, all contractors considering submitting a bid for this

project are strongly encouraged to attend. The mechanical engineer will be available to answer questions related to the construction plans and construction specifications.

6. QUESTIONS / REQUESTS FOR CLARIFICATION

   All questions and requests for clarification shall be submitted in writing to the ULM purchasing office at least seven (7) days prior to the bid date. If necessary, ULM will issue an addendum to provide answers and clarifications.

7. AREA OF WORK – Safety and Protection

   The contractor shall post warning signs and barriers as necessary to ensure that students, faculty, staff, and the general public avoid the work area. The contractor may store materials on site provided the materials are stored in a location and manner that does not interfere with the University and does not damage existing facilities (grounds, grass, sidewalks, parking lots, etc.)

8. CONSTRUCTION SCHEDULE / HVAC OUTAGES

   The base bid shall be fully completed no later than August 1, 2013. The HVAC systems in the base bid (sky box and press box) do not have to remain operational during the course of work. No one will be occupying these areas until August 1, 2013. All work in these areas including final cleaning must be fully completed no later than August 1, 2013.

   If accepted, the three add alternates must be completed no later than December 31, 2013. The three add alternates include work associated with replacing the main cooling tower that provides chilled water to much of the interior spaces of Malone Stadium. The University will not allow an HVAC outage to occur during the warmer temperatures so that we can provide adequate air conditioning to the occupants of Malone Stadium. If these alternates are accepted, this work will probably be conducted in late fall 2013 after outside air temperatures have cooled to a point that air conditioning is not required.

9. LIQUIDATED DAMAGES

   The University will assess liquidated damages to the contractor for failure to comply with the schedule of the work. Liquidated damages shall be assessed at the rate of $250 per day for each additional day required to fully complete the scope of work. The contractor shall fully complete all work in the base bid on or before August 1, 2013. If accepted the contractor, shall fully complete the work associated with each add alternate on or before December 31, 2013.

10. DAMAGES TO FACILITIES

Contractor shall be responsible for all damages to the existing site, facilities, furniture, and equipment that are caused by this project. The contractor shall carefully document existing site conditions and existing damages prior to commencing work. The contractor shall repair all damage to its original, undamaged condition prior to completing this project. The contractor shall note that residential units may have furniture that remains. University personnel plan to remove and store most of the beds and mattresses prior to construction beginning. The contractor shall protect all existing furniture and equipment. The contractor shall protect all flooring surfaces.

11. COMPLIANCE AND SAFETY REQUIREMENTS

Contractor shall be required to adhere to all University safety and health policies. Contractor shall fully comply with all applicable laws, rules, regulations, permits, etc. This includes but is not limited to the following: the contractor must use an OSHA approved lockout / tagout program that meets or exceeds the University's policy, the contractor shall properly label all chemical containers used during the project, the contractor shall have a material safety data sheet (MSDS) for each product used during the project, etc. All employees shall wear fall protection equipment as required when working at elevated levels. All employees will not be allowed to use tobacco products on the project site. Contractor, subcontractors, material suppliers and all employees must be properly trained and fully comply with occupational safety and health regulations. Any accidents, incidents, near misses, etc. will be reported to the University project coordinator immediately and the University may investigate these events. The University reserves the right to require the contractor to remove any employee from the project if the employee is observed violating safety rules, regulations, policies, etc.

12. PROFESSIONAL CONDUCT

The contractor, sub-contractors, material suppliers, and all workers associated with the project shall conduct themselves in a professional manner at all times. All employees shall wear identification that clearly identifies them as a contract employee. This could be a uniform shirt or name badge. Shirts shall be neatly tucked into trousers. Contractors shall not be allowed to wear sleeveless shirts, tank tops, etc. No profanity will be allowed for any reason. The University reserves the right to require the contractor to remove any employee from the job immediately for failure to comply with these requirements and / or for failure to comply with University policies / procedures, and all other applicable laws, rules, and requirements.

13. USE OF UNIVERSITY FACILITIES

The contractor, sub-contractors, material suppliers, and all workers associated with the project shall not use University facilities such as restrooms, break rooms, vending machines, etc. The contractor shall supply a portable restroom for their employees to use.

14. USE OF TOBACCO PRODUCTS

Tobacco use will only be allowed in personal vehicles. See ULM's tobacco use policy for detailed information at http://www.ulm.edu/tobaccouse/

15. WARRANTY

Contractor shall fully warranty all work completed for a full year from the date of acceptance by the owner. Contractor shall respond on site to the University within forty eight (48) hours of receiving a phone or email notification of a warranty issue from the University. All warranty repairs and service shall be completed at no charge to the University. This warranty is in addition to any manufacturer warranties that may be applicable to this project.

16. DISPOSAL

Contractor shall dispose of all construction debris, trash, and other materials in compliance with all applicable laws, rules, regulations, permits, etc.

BID DOCUMENTS

REPLACE PRESSBOX AND SKYBOX HVAC AT MALONE STADIUM

UNIVERSITY OF LOUISIANA AT MONROE

Issue Date:
March 14, 2013

JOHN J. GUTH ASSOCIATES, INC.
208 MILAM STREET
SHREVEPORT, LOUISIANA 71101
PHONE: (318)221.8638 | FAX: (318)221.8717

Guth PN 22-6339

TABLE OF CONTENTS

REPLACE PRESSBOX AND SKYBOX HVAC
AT MALONE STADIUM
UNIVERSITY OF LOUISIANA AT MONROE

TABLE OF CONTENTS

REPLACE PRESSBOX AND SKYBOX HVAC
AT MALONE STADIUM
UNIVERSITY OF LOUISIANA AT MONROE

UNIVERSITY OF LOUISIANA AT MONROE
REPLACE PRESSBOX AND SKYBOX HVAC
AT MALONE STADIUM

GUTH PN 22-6339

SEALS & CERTIFICATION

SPECIFICATION DIVISIONS/SECTIONS PREPARED UNDER MY RESPONSIBLE SUPERVISION:

DIVISION 01 GENERAL REQUIREMENTS
DIVISION 02 SITE CONSTRUCTION
DIVISION 05 METALS
DIVISION 09 FINISHES
DIVISION 15 MECHANICAL

JOHN C. WILSON, P.E., PRESIDENT
MECHANICAL ENGINEER – LA LICENSE 19008

SPECIFICATION DIVISIONS/SECTIONS PREPARED UNDER MY RESPONSIBLE SUPERVISION:

DIVISION 16 ELECTRICAL

J. PATRICK FOREMAN, P.E.
ELECTRICAL ENGINEER – LA LICENSE 22378

SECTION 01010 - SUMMARY OF THE WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to work of this Section.

1.2 PROJECT/WORK IDENTIFICATION

A. General: Project name is **"REPLACE PRESSBOX AND SKYBOX HVAC AT MALONE STADIUM AT THE UNIVERSITY OF LOUISIANA AT MONROE"** as shown on Contract Documents prepared by John J. Guth Associates, Inc. Drawings and Specifications are dated **MARCH 14, 2013**.

B. Summary by References: Work of the Contract can be summarized by references to the Contract, General Conditions, Supplementary Conditions, Specification Sections, Drawings, Addenda, and modifications to the Contract Documents issued as part of Addenda subsequent to the initial printing of this Project Manual and including, but not necessarily limited to, printed material referenced by any of these. It is recognized that work of the Contract is also unavoidably affected or influenced by governing regulations, natural phenomenon, including weather conditions, and other forces outside the Contract Documents.

C. Abbreviated Written Summary: Briefly and without force and effect upon the Contract Documents, the work of the Contract can be summarized as follows:

1. The work includes replacement of the existing Pressbox and Skybox HVAC systems as well as the cooling tower and condenser water pumps.

D. Sequence of Work: Sequence work for minimum interruption of the Owner's operation. Heating outages shall be limited to times when the outdoor temperature is above 60 degrees F. Cooling outages will be limited to times when outdoor temperature is below 60 degrees F. Provide any required overtime work including after hours utility outages to accomplish this sequence at no additional cost to the owner.

E. Outages must be for a minimum time and must be approved by the Owner.

F. Completion Date: As required by Instructions to Bidders, the Contractor is required to fully complete construction of project within specified number of days. Contractor shall furnish sufficient forces, construction plant and equipment, and work such hours, including weekend and night shifts as may be necessary to insure prosecution of work in accordance with schedule to the contracted completion date. If, in the opinion of the Architect and Owner, Contractor falls behind progress schedule, Contractor shall take steps as may be necessary to improve his progress by such means as increasing number of men, number of shifts, days of work, and/or amount of construction plant, all without additional cost to Owner. If access to building is required at other than normal building hours, Contractor shall make arrangements with University of Louisiana at Monroe, Physical Plant.

G. Local building permits are not required.

1.3 CONTRACTOR USE OF PREMISES

A. General: The Contractor shall limit his use of the premises to the work indicated, so as to allow for Owner occupancy with minimum interruptions.

B. Use of the Site: Confine operations at the site to the areas permitted under the Contract. Portions of the site beyond areas on which work is indicated are not to be disturbed. Conform to site rules and regulations affecting the work while engaged in project construction.

C. Keep existing driveways and entrances serving the premises clear and available to the Owner and his employees at all times. Do not use these areas for parking or storage of materials.

D. Do not unreasonably encumber the site with materials or equipment. Confine stockpiling of materials and location of storage sheds to the areas approved by the Owner. If additional storage is necessary, obtain and pay for such storage off-site. The Owner will not make payments for materials stored off-site.

E. Lock automotive type vehicles, such as passenger cars and trucks and other mechanized or motorized construction equipment, when parked and unattended, so as to prevent unauthorized use. Do not leave such vehicles or equipment unattended with the motor running or the ignition key in place.

F. Use of existing toilets within the buildings by the Contractor and his personnel will not be permitted.

G. General Requirements: Observe no smoking rules. All personnel must wear shirts. No radios or similar items may be used.

H. Asbestos: No asbestos-containing materials have been identified on items that are indicated to be disturbed. If asbestos-containing materials are encountered, comply with the following:

1. Upon encountering any previously unidentified materials which he suspects may contain asbestos, the Contractor shall immediately cease all work in the immediate vicinity of the suspected materials and notify the Designer and the Owner. The Owner shall retain consultants to identify the suspected materials. Upon identification, the Owner reserves the right to contract separately for the removal, or require the Contractor to remove said materials in accordance with the following provision. In any case, the work shall be performed by a licensed and certified Abatement Contractor.
2. The Louisiana Department of Environmental Quality (D.E.Q.) has issued the Louisiana Emission Standards for Hazardous Air Pollutants. Where asbestos is encountered in a project, the Contractor shall comply with all laws and ordinances pertaining to asbestos handling and abatement, including the latest revision of LAC 33:111, Chapter 25, Subchapter F, Emission Standards for Hazardous Air Pollutants, LAC 33:111, Chapter 27, Asbestos Containing Materials in Schools and Public Buildings and LAC 33:111, Chapter 51, Subchapter M, Section 5151, Emission Standards for Asbestos.
3. Notification should be addressed to:

Asbestos Coordinator
Louisiana Department of Environmental Quality

Air Quality Division
Post Office Box 82135
Baton Rouge, Louisiana 70884-2135

4. If the Owner chooses to remove any previously unidentified materials by utilizing different Contractors, the Contractor shall cooperate fully with the Owner's consultants and asbestos abatement Contractor permitting them full access to the project, and shall not resume work in the vicinity of the suspected materials until advised by the Designer and the Owner that it is safe to do so.

I. Comply with OSHA requirements including the Hazard Communication Standard.

1.4 OWNER OCCUPANCY

A. Full Owner Occupancy: The Owner will occupy the site during the entire period of construction. Cooperate fully with the Owner and his representative during construction operations to minimize conflicts and to facilitate Owner usage. Perform the work so as not to interfere with the Owner's operations.

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION (Not applicable)

END OF SECTION 01010

SECTION 01030 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

B. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the Alternate into the Project.

B. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

1. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each Alternate. Indicated if Alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to Alternates.
2. Execute accepted Alternates under the same conditions as other work of the Contract.
3. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in Schedule contain requirements for materials necessary to achieve the work described under each Alternate.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1: **ADD the following work:** All work associated with the replacement of cooling tower #1 and condenser water pump #1A.

B. Alternate No. 2: **ADD the following work:** Provide variable frequency drive for Cooling Tower #1.

C. Alternate No. 3: **ADD the following work:** Provide condenser water pump #1B.

END OF SECTION 01030

SECTION 01045 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for cutting and patching.

B. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the work.

1. Requirements of this Section apply to mechanical installations. Refer to Division 15 Sections for other requirements and limitations applicable to cutting and patching mechanical installations.

C. Demolition of selected portions of the building for alterations is included in Division 1 Section 01732, "Selective Demolition."

1.3 SUBMITTALS

A. Cutting and Patching Proposal: Where approval of procedures for cutting and patching is required before proceeding, submit a proposal describing procedures well in advance of the time cutting and patching will be performed and request approval to proceed. Include the following information, as applicable, in the proposal:

1. Describe the extent of cutting and patching required and how it is to be performed; indicate why it cannot be avoided.
2. Describe anticipated results in terms of changes to existing construction; include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.
3. List products to be used and firms or entities that will perform work.
4. Indicate dates when cutting and patching is to be performed.
5. List utilities that will be disturbed or affected, including those that will be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.
6. Where cutting and patching involves addition of reinforcement to structural elements, submit details and engineering calculations to show how reinforcement is integrated with the original structure.
7. Approval by the Architect to proceed with cutting and patching does not waive the Architect's right to later require complete removal and replacement of a part of the Work found to be unsatisfactory.

1.4 QUALITY ASSURANCE

A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.

1. Foundation construction.
2. Bearing and retaining wall.
3. Structural concrete.
4. Structural steel.
5. Lintels.
6. Timber and primary wood framing.
7. Structural decking.
8. Stair systems.
9. Miscellaneous structural metals.
10. Exterior curtain wall construction.
11. Equipment supports.
12. Piping, ductwork, vessels and equipment.

B. Operational and Safety Limitations: Do not cut and patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety.

1. Obtain approval of the cutting and patching proposal before cutting and patching the following operating elements or safety related systems:

a. Shoring, bracing, and sheeting.
b. Primary operational systems and equipment.
c. Air or smoke barriers.
d. Water, moisture, or vapor barriers.
e. Membranes and flashings.
f. Fire protection systems.
g. Noise and vibration control elements and systems.
h. Control systems.
i. Communication systems.
j. Conveying systems.
k. Electrical wiring systems.

C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace work cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Use materials that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.

PART 3 - EXECUTION

3.1 INSPECTION

A. Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.

1. Before proceeding, meet at the site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.

C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Take all precautions necessary to avoid cutting existing pipe, conduit or ductwork serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.

3.3 PERFORMANCE

A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.

1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.

B. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible review proposed procedures with the original installer; comply with the original installer's recommendations.

1. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
3. Cut through concrete and masonry using a cutting machine such as a carborundum saw or diamond core drill.
4. Comply with requirements of applicable Sections of Division 2 where cutting and patching requires excavating and backfilling.
5. By-pass utility services such as pipe or conduit, before cutting, where services are shown or required to be removed, relocated or abandoned. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.

C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.

1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
3. Where removal of walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary to achieve uniform color and appearance.

    a. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken containing the patch, after the patched area has received primer and second coat.

4. Patch, repair or rehang existing ceilings as necessary to provide an even plane surface of uniform appearance.

3.4 CLEANING

A. Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove completely paint, mortar, oils, putty and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

END OF SECTION 01045

SECTION 01090 - DEFINITIONS AND STANDARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to work of this Section.

1.2 DESCRIPTION OF REQUIREMENTS

A. General: This section specifies procedural and administrative requirements for compliance with governing regulations and codes and standards imposed upon the work. These requirements include obtaining permits, licenses, inspections, releases, and similar documentation, as well as payments, statements, and similar requirements associated with regulations, codes, and standards.

B. The term "Regulations" is defined to include laws, statutes, ordinances, and lawful orders issued by governing authorities, as well as those rules, conventions, and agreements within the construction industry which effectively control the performance of the work regardless of whether they are lawfully imposed by governing authority or not.

1.3 DEFINITIONS

A. General Explanation: Certain terms used in contract documents are defined in this article. Definitions and explanations contained in this section are not necessarily complete, but are general for the work to extent that they are not stated more explicitly in another element of the contract documents.

B. General Requirements: Provisions and requirements of other Division-1 sections apply to the entire work of the Contract and, where so indicated, to other elements which are included in the project.

C. Indicated: The term "indicated" is a cross-reference to graphic representations, notes, or schedules on the drawings, to other paragraphs or schedules in the specifications, and to similar means of recording requirements in contract documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used in lieu of "indicated," it is for the purpose of helping the reader locate the cross-reference, and no limitation of location is intended except as specifically noted.

D. Directed, Requested, Etc.: Terms such as "directed," "requested," "authorized," "selected," "approved," "required," "accepted," and "permitted" mean "directed by the Architect," "requested by the Architect," and similar phrases. However, no such implied meaning will be interpreted to extend the Architect's responsibility into the Contractor's area of construction supervision.

E. Approve: Where used in conjunction with the Architect's response to submittals, requests, applications, inquiries, reports, and claims by the Contractor, the term "approved" will be held to limitations of the Architect's responsibilities and duties as specified in General and

Supplementary Conditions. In no case will the Architect's approval be interpreted as a release of the Contractor from responsibilities to fulfill requirements of contract documents or acceptance of the work, unless otherwise provided by requirements of the contract documents.

F. Project Site: The term "project site" means the space available to the Contractor for performance of the work, either exclusively or in conjunction with others performing other construction as part of the project. The extent of the project site is shown on the drawings, and may or may not be identical with the description of the land upon which the project is to be built.

G. Furnish: The term "furnish" is used to mean "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations."

H. Install: The term "install" is used to describe operations at project site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimensions, finishing, curing, protecting, cleaning, and similar operations."

I. Provide: The term "provide" means "to furnish and install, complete and ready for the intended use."

J. Installer: The "installer" is "the entity" (person or firm) engaged by the Contractor, its subcontractor, or sub-subcontractor for performance of a particular element of construction at the project site, including installation, erection, application, and similar required operations. It is a requirement that installers are experienced in the operations they are engaged to perform.

K. Testing Laboratory: A "testing laboratory" is an independent entity engaged to perform specific inspections or tests of the work, either at the project site or elsewhere; and to report and (if required) interpret results of those inspections or tests.

1.4 INDUSTRY STANDARDS

A. Applicability of Standards: Except where more explicit or stringent requirements are written into the contract documents, applicable construction standards have the same force and effect as if bound into or copied directly into the contract documents. Such industry standards are made a part of the contract documents by reference. Individual specification sections indicate which codes and standards the Contractor must keep available at the project site for reference.

B. Referenced standards (standards referenced directly in the contract documents) take precedence over standards that are not referenced but generally recognized in the industry for applicability to the work.

C. Unreferenced Standards: Except as otherwise limited by the contract documents, standards not referenced but recognized in the construction industry as having direct applicability will be enforced for performance of the work. The decision as to whether an industry code or standard is applicable, or as to which of several standards are applicable, is the sole responsibility of the Architect.

D. Publication Dates: Except as otherwise indicated, where compliance with an industry standard is required, comply with standard in effect as of date of contract documents.

E. Conflicting Requirements: Where compliance with two or more standards is specified, and where these standards establish different or conflicting requirements for minimum quantities or quality levels, the most stringent requirement will be enforced, unless the contract documents specifically indicate otherwise. Refer requirements that are different, but apparently equal, and uncertainties as to which quality level is more stringent to the Architect for a decision before proceeding.

F. Minimum Quantities or Quality Levels: In every instance, the quantity or quality level shown or specified is intended to be the minimum to be provided or performed. Unless otherwise indicated, the actual work may either comply exactly, within specified tolerances, with the minimum quantity or quality specified, or may exceed that minimum within reasonable limits. In complying with these requirements, the indicated numeric values are minimum or maximum values, as noted, or as appropriate for the context of the requirements. Refer instances of uncertainty to the Architect for decision before proceeding.

G. Copies of Standards: The contract documents require that each entity performing work be experienced in that part of the work being performed. Each entity is also required to be familiar with industry standards applicable to that part of the work. Copies of applicable standards are not bound with the contract documents.

H. Where copies of standards are needed for proper performance of the work, the Contractor is required to obtain such copies directly from the publication source.

I. Although copies of standards needed for enforcement of requirements may be required submittals, the Architect reserves the right to require the Contractor to submit additional copies as necessary for enforcement of requirements.

J. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. Where acronyms or abbreviations are used in specifications or other contract documents they are defined to mean the recognized name of the trade association, standards generating organization, governing authority or other entity applicable to the context of the text provision. Refer to the "Encyclopedia of Associations," published by Gale Research Co., available in most libraries.

1.5 SUBMITTALS

A. Permits, Licenses, and Certifications: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing upon performance of the work.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01090

SECTION 01200 - PROJECT MEETINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to work of this Section.

1.2 RELATED SECTIONS

A. Construction Schedule: Division 1 Section 01400, "Submittals."

1.3 PROGRESS MEETINGS

A. Architect shall schedule and administer monthly progress meetings during the construction period. Required attendance shall be:

1. Architect and his professional consultants, as needed.
2. Contractor.
3. Subcontractors, as appropriate.
4. Suppliers, as appropriate.

B. The Owner shall be notified of such meetings and may be represented. It shall be the principal purpose of these meetings or conferences to effect coordination, cooperation, and assistance in every practical way to the end of maintaining progress of the project on schedule and completing the project within the contract time.

C. Suggested Agenda:

1. Review work progress since last meeting.
2. Note field observations, problems, and decisions.
3. Review off-site fabrication problems.
4. Revise construction schedule, as indicated.
5. Review submittal schedules, expedite as required to maintain schedule.
6. Review changes proposed by Owner for effect on construction schedule and effect on completion date.

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION (Not applicable)

END OF SECTION 01200

SECTION 01400 - SUBMITTALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to work of this Section.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Additional Submittal Requirements: Division 0 Section 00700, "AIA Document A201-2007, General Conditions of the Contract for Construction."

B. Closeout Submittals: Division 1 Section 01700, "Project Closeout."

1.3 CONSTRUCTION SCHEDULE

A. General: As required by Article 3.10 of the General Conditions, Contractor shall, within ten days after signing the Contract, prepare and submit to Architect for information purposes, a practical schedule showing order in which Contractor proposes to carry on work, dates on which he will start salient features of work, and contemplated dates for completion. Schedule shall meet or better construction time included on Instructions to Bidders.

B. Form of Schedule: Provide in form of horizontal bar chart. Provide separate horizontal bar column for each trade or operation. Order shall be Table of Contents from Project Manual or the chronological order of beginning of each item of work. Submit three copies to Architect.

C. Content of Schedule: Provide complete sequence of construction activity, dates for beginning, and completion of each element of construction. Identify work of separate phases or other logically grouped activities. Show projected percentage of completion for each item of work as of first day of each month.

1.4 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

A. Shop Drawings:

1. Submit prints of original drawings prepared by Contractor, subcontractor, supplier, or distributor which illustrate same portion of work; showing fabrication, layout setting, or erection details.
2. Minor corrections needed on prints will be made by Architect; for extensive modifications, prints may be returned to Contractor for correction. When reviewed, Architect will retain two copies for record and return remaining copies to General Contractor for distribution. Reproducible copies of shop drawings will not be reviewed.

B. Product Data:

1. Manufacturer's Standard Drawings: Modify Drawings to delete information which is not applicable to Project. Supplement standard information to provide additional information applicable to Project.
2. Manufacturer's Catalog Sheet, Brochures, and Diagrams: Clearly mark each copy to identify pertinent materials, product, or models. Show dimensions and clearances required. Show performance characteristics and capacities.

C. Samples:

1. Physical examples to illustrate materials, equipment, or workmanship to establish standards by which completed work is judged.
2. Office samples shall be of sufficient size and quantity to clearly illustrate functional characteristics of product or material and full range of color and texture samples.

D. General Submission Requirements:

1. Quantities: Submit the number of copies of product data and shop drawings that the Contractor requires for distribution, plus two copies which will be retained by the Architect. Quantity of samples required shall be as specified in Specification Section for respective product.

E. Submittals shall include:

1. Project title
2. Names of Contractor, Subcontractor, Supplier, Manufacturer
3. Identification of Product
4. Relation to adjacent structure or materials
5. Field dimensions
6. Reference to Architect's Drawing numbers, Specification Section, room numbers, structural framing marks, and/or numbers
7. Applicable standards: e.g., ASTM
8. Blank space for Architect's stamp
9. Identification of deviations from Contract Documents
10. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of field measurements, and compliance with Contract Documents.

F. These requirements are in addition to those in Article 3.12 of General Conditions.

1.5 SCHEDULE OF VALUES

A. General: As required by Article 9.2 of General Conditions, submit to Architect a Schedule of Values at least ten days prior to submitting first Application for Payment. Upon request by Architect, support values with data that will substantiate their correctness. Use Schedule of Values only as basis for Contractor's Application for Payment. Itemize separate line item cost for work required by each Section of this Specification.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01400

SECTION 01500 - TEMPORARY FACILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to the work of this Section.

1.2 TEMPORARY UTILITIES

A. Temporary Services: Contractor shall arrange and pay for all hook-ups, meters for all temporary utility services for construction, and, as necessary, for the proper and expeditious prosecution of the work. The Contractor shall provide piping, conduit, etc., and make all connections to existing services and sources of supply, and pay all charges for same. The Contractor shall pay for all utilities usage during the time of construction directly to the utility company. Contractor shall provide all labor, materials, equipment and appliances necessary for the complete installation, operation, and maintenance of all temporary service systems and facilities. Contractor shall remove all such temporary installations and connections when no longer required, or when directed.

B. Electric power used in existing buildings for operating tools and testing of equipment will be furnished by the User Agency at no charge, but the Contractor shall provide any required temporary facilities and remove same when no longer required.

1.3 BARRICADES, LIGHTS, AND WATCHMEN

A. Where the work is constructed in or adjacent to any road, parking area, or public place, the Contractor shall, at his own cost and expense, furnish and erect such barricades, lights, and danger signals, shall provide such watchmen, and take such other precautionary measures for the protection of persons and property and of the work, as are necessary. At the completion of construction, all barricades and all traces thereof, shall be removed, holes filled, paving repaired, etc.

1.4 TEMPORARY LADDERS, SCAFFOLDS, HOISTS, ETC.

A. Contractor shall provide and maintain all equipment such as temporary ladders, ramps, scaffolds, hoists, runways, derricks, chutes, etc., as required for the proper execution of the work.

B. All such apparatus, equipment, and construction shall meet all requirements of the Labor Law and other Federal and State Laws applicable thereto.

C. Contractor shall provide, maintain, and remove at completion of work all scaffolding required for the execution of the work. Erect scaffolding on the side of the wall on which work occurs. No scaffolding shall be built into any work.

D. Scaffolding for all other work shall be provided, installed, maintained, and removed at completion of work by the trade requiring such scaffolding.

1.5 STORAGE OF MATERIALS

A. Contractor shall provide, on the premises where directed, suitable storage sheds (substantial and watertight) in which he shall store all materials subject to damage by weather. All storage sheds shall be of sufficient size to hold all materials required on the site at one time, and shall have floors raised at least 6" above the ground on heavy joists or sleepers. Storage sheds shall have neat appearance.

B. Major subcontractors shall provide such temporary buildings as, in the opinion of the Architect, may be necessary to fully protect their materials, equipment, apparatus, etc., during the progress of the work. Such buildings shall have neat appearance.

C. Building materials, Contractor's equipment, etc., shall be stored on the premises in a manner so that it may be observed at any time by the Architect.

D. All materials affected by the weather shall be covered and protected and kept free from damage while being transported to the site.

E. Subcontractors desiring to store materials scheduled for immediate use in the building may do so only in locations as directed by the General Contractor and approved by the Architect.

1.6 CONTRACTORS FIELD OFFICE

A. Provide prefabricated or mobile units or similar job-built construction with lockable entrances, operable windows, and serviceable finishes.

B. The office shall be located convenient to the work. It shall be adequately heated, ventilated, electrically lighted, and provided with telephone service, all at the expense of the Contractor.

1.7 SANITARY FACILITIES

A. Provide single-occupant, self-contained toilet units of the chemical, aerated recirculation, or combustion type, properly vented and fully enclosed with a glass fiber reinforced polyester shell or similar non-absorbent material. Contractor shall keep such place in sanitary condition and remove at completion of contract. Facility fixtures shall not be used by workmen. Comply with all applicable codes, utility, and safety regulations.

1.8 LAYING-OUT OF WORK

A. Contractor shall compare all drawings and verify all dimensions, and shall take any and all measurements necessary to verify the drawing dimensions in relation to conditions already established at the job site before laying out the work. Contractor will be held responsible for subsequent errors which could have been avoided by such checking.

B. Any discrepancy which will affect the proper layout of the work shall be immediately called to the attention of the Architect by the Contractor. No work shall proceed until such discrepancy has been rectified as directed by the Architect.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01500

SECTION 01600 - MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including General and Supplementary Conditions, apply to the work specified in this Section. Refer to other Division 1 Sections for additional requirements which may affect the work of this Section.

1.2 GENERAL PRODUCT REQUIREMENTS

A. Provide products, materials, and equipment which comply with the requirements and which are undamaged and unused at the time of installation, and which are complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and for the intended use and effect. Do not use material or equipment for any purpose other than that for which it is designed or specified.

1.3 MANUFACTURER'S INSTRUCTIONS

A. When Contract Documents require that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including two copies to Architect. Maintain one set of complete instructions at the job site during installation and until completion.

B. Handle, install, connect, clean, condition, and adjust product in strict accord with such instructions and in conformity with specified requirements. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with Architect for further instructions. Do not proceed with work without clear instructions.

C. Perform work in accord with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

1.4 TRANSPORTATION AND HANDLING

A. Arrange deliveries of products in accord with construction schedules, coordinate to avoid conflict with work and conditions at the site. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals, and that products are properly protected and undamaged.

B. Provide equipment and personnel to handle products by method to prevent soiling or damage to products or packaging.

1.5 STORAGE AND PROTECTION

A. Store products in accord with manufacturer's instructions, with seals and labels intact and legible. Store products subject to damage by the elements in weathertight enclosures. Maintain temperature and humidity within the ranges required by manufacturer's instructions.

B. Exterior Storage: Store fabricated products above the ground, on blocking or skids, prevent soiling or staining. Cover products which are subject to deterioration with impervious sheet coverings, provide adequate ventilation to avoid condensation. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.

C. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration.

D. Protection After Installation: Provide substantial coverings as necessary to protect installed products from damage from traffic and subsequent construction operations. Remove when no longer needed.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01600

SECTION 01700 - PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to work of this Section.

1.2 DESCRIPTION OF REQUIREMENTS

A. Definitions: Project closeout is the term used to describe certain collective project requirements, indicating completion of the work that is to be fulfilled near the end of the contract time in preparation for final acceptance and occupancy of the work by the Owner, as well as final payment to the Contractor and the normal termination of the Contract.

B. Specific requirements for individual units of work are included in the appropriate Sections in Division 2 through 16.

1.3 CLOSEOUT SUBMITTALS

A. Submit to Architect for review, four copies each of the following items and other items as specified. Approved copies will be transmitted to Owner by Architect.

B. Operation and Maintenance Data: Refer to Article titled "Operation and Maintenance Manuals" hereinafter this Section.

C. Record Drawings: Refer to "Record Drawings" article hereinafter this section (one copy required).

D. Release of Liens: AIA Form G706A, refer to Article 9.10 of the General Conditions.

E. Consent of Surety to Final Payment: AIA Form G707, refer to Article 9.10 of General Conditions.

1.4 OPERATION AND MAINTENANCE MANUALS

A. Purpose: Operation and maintenance manuals will be used for training of, and use by, the Owner and his employees in the operation and maintenance of the systems and related equipment as specified below. A separate manual or chapter shall be prepared for instructions of each class of equipment or system.

B. Contents: Manuals shall contain the following information on each item of equipment:

1. Routine maintenance operations
2. Complete operating instructions
3. Service instructions

4. Complete control wiring
5. Emergency procedure
6. Equipment warranties or guarantees

C. Preparation: The manuals shall be prepared to provide for the optimum operation and maintenance of the various systems outlined above and equipment forming a part of these systems. Manufacturer's literature and data shall be that of the actual equipment installed under contract for the particular facility. Each manual containing the systems noted shall be bound in one or more volumes as required for convenience in handling.

1.5 INSTRUCTIONS

A. Instruct Owner's personnel in operation of all systems, mechanical, electrical, and other equipment in accordance with respective specification sections and manufacturer's instructions.

1.6 RECORD DRAWINGS

A. Mark-Up Procedure: During progress of work, maintain a white-print set of contract drawings and shop drawings, with mark-up of actual installations which vary substantially from the work as originally shown. Mark whatever drawing is most capable of showing actual physical condition, fully and accurately. Where shop drawings are marked up, cross-reference on contract drawings at corresponding location. Mark with erasable colored pencil, using separate colors where feasible to distinguish between changes for different categories of work at same general location. Mark-up important additional information which was either shown schematically or omitted from original drawings. Give particular attention to information on work concealed, which would be difficult to identify or measure and record at a later date. Note alternate numbers, change order numbers, and similar identification.

B. Submittal: At the conclusion of the Contract, the final set of record prints shall be prepared by the Architect from information obtained from the Contractor.

1.7 CLEANING UP

A. No rubbish shall be allowed to accumulate or be allowed to remain on the premises or job site beyond a reasonable length of time. Trash shall be removed from within the building and from the site daily. Particular attention shall be given to these requirements.

B. All rubbish shall be removed by means of chutes, hoists, or receptacles. Under no circumstances shall any rubbish or waste be dropped or thrown from one level to another within or outside the buildings. Immediately after unpacking materials, all packing case lumber and other packing materials, excelsior, wrappings, and other like flammable wastes shall be collected and removed from the buildings and premises. Burning of trash on the site will not be permitted.

C. Care shall be taken by all workmen not to mark, soil, or otherwise deface any finishes. In the event that any finishes become defaced in any way by mechanics or workmen, the Contractor or any of his sub-contractors shall clean and restore such surfaces to their original condition.

D. Each subcontractor engaged upon the work shall bear his full responsibility for leaving all work in a clean and proper condition, satisfactory to the Owner and the Architect.

E. Final Cleaning: Beside the general broom cleaning, the following cleaning shall be done just before final acceptance of the work:

1. Remove all labels not intended for permanent installation.
2. Remove all marks, stains, fingerprints, and other soil or dirt from all painted work, and clean as required to leave in first class condition.
3. Clean all equipment removing all stains, paint, dirt, and dust.

F. Upon completion of the work, the Contractor will be required to thoroughly clean the building site and surrounding ground, and all trash and rubbish left by him in the course of construction of the work shall be removed and disposed of off the site of work.

G. Contractor shall haul off all debris from the site to legal disposal areas and dispose of all debris and excess materials resulting from project work. No burning of material or debris shall be done at site. In hauling material from the site, it shall be the responsibility of the Contractor to prevent debris from dropping from vehicles and littering the site and any public thoroughfare.

1.8 SUBSTANTIAL COMPLETION

A. Inspection and other procedures for Contractor to follow to process Contract through Substantial Completion are specified in General and Supplementary Conditions, Articles 9.8 and 9.9.

1.9 FINAL INSPECTION

A. Contractor shall submit written certification that:

1. Contract Documents have been reviewed.
2. Project has been inspected for compliance with Contract Documents.
3. Work has been completed in accordance with Contract Documents.
4. Equipment and systems have been tested in presence of Owner's Representative and are operational.
5. Project is completed, and ready for final inspection.

B. Architect will make final inspection after receipt of certification.

C. Should Architect consider that work is not finally complete, he will notify Contractor, in writing, stating reasons. Contractor shall take immediate steps to remedy the stated deficiencies, and send second written notice to Architect certifying that work is complete. Architect will reinspect work.

1.10 FINAL PAYMENT

A. Application for final payment shall be submitted together with documents specified in General and Supplementary Conditions, Article 9.10 "Final Completion and Final Payment".

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01700

SECTION 01732 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Demolition and removal of selected portions of a building or structure.
2. Repair procedures for selective demolition operations.

B. Related Sections include the following:

1. Division 1 Section 01010, "Summary of Work," for use of the premises and phasing requirements.
2. Division 1 Section 01500, "Temporary Facilities," for temporary construction and environmental-protection measures for selective demolition operations.
3. Division 1 Section 01045, "Cutting and Patching," for cutting and patching procedures for selective demolition operations.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Detach items from existing construction and deliver them to Owner.

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site.

1.5 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Standards: Comply with ANSI A10.6 and NFPA 241.

D. Pre-Demolition Conference: Conduct conference at Project site to review methods and procedures related to selective demolition including, but not limited to, the following:

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Discuss select material to be salvaged by Owner.

1.6 PROJECT CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

B. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.

1. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from authorities having jurisdiction.

C. Owner assumes no responsibility for condition of areas to be selectively demolished.

1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site will not be permitted.

F. Utility Service: Maintain existing utilities on roof in service unless indicated to be removed and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

G. Notify Engineer of discrepancies between existing conditions and drawings before proceeding with selective demolition.

1.7 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 REPAIR MATERIALS

A. Use repair materials identical to existing materials.

1. If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
2. Use materials whose installed performance equals or surpasses that of existing materials.

B. Comply with material and installation requirements specified in individual Specification Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. Inventory and record the condition of any items to be removed and salvaged.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Engineer.

E. Perform surveys as the work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES

A. Existing Utilities: Maintain services indicated to remain and protect them against damage during selective demolition operations.

B. Do not interrupt existing utilities serving occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.

1. Provide at least 72 hours' notice to Owner if shutdown of service is required during changeover.

C. Utility Requirements: Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be selectively demolished.

1. Where required, Owner will arrange to shut off indicated utilities when requested by Contractor.
2. If utility services are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary utilities that bypass area of selective demolition and that maintain continuity of service to other parts of building.
3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

D. Utility Requirements: Refer to Division 15 and 16 Sections for shutting off, disconnecting, removing, and sealing or capping utilities. Do not start selective demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
2. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
3. Protect existing site improvements, appurtenances, and landscaping to remain.

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.

C. Temporary Shoring: Provide and maintain interior bracing or structural support to preserve stability and prevent movement, settlement, or collapse of construction to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports during progress of selective demolition and before new rooftop air conditioning units are placed on roof.

3.4 POLLUTION CONTROLS

A. Dust Control: Use temporary enclosures and other suitable methods to limit spread of dust and dirt.

1. Do not use water when it may damage existing construction or create hazardous or objectionable conditions.
2. Wet mop floors to eliminate trackable dirt and wipe down walls and doors of demolition enclosure. Vacuum carpeted areas.

B. Disposal: Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

1. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

C. Cleaning: Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

3.5 SELECTIVE DEMOLITION

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.

8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly.
10. Return elements of construction and surfaces that are to remain to condition existing before selective demolition operations began.

B. Existing Facilities: Comply with building manager's requirements for using and protecting building facilities during selective demolition operations.

C. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Engineer, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

D. Roofing: Remove no more existing roofing than can be covered in one day by new roofing. Refer to applicable Division 7 Section for new roofing requirements.

E. Air Conditioning Equipment: Remove equipment without releasing refrigerants.

3.6 PATCHING AND REPAIRS

A. General: Promptly repair damage to adjacent construction caused by selective demolition operations.

B. Patching: Comply with Division 1 Section 01045, "Cutting and Patching."

C. Repairs: Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.

1. Completely fill holes and depressions in existing masonry walls that are to remain with an approved masonry patching material applied according to manufacturer's written recommendations.

D. Finishes: Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.

E. Ceilings: Patch, repair, or re-hang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

END OF SECTION 01732

SECTION 02831 - CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Zinc-aluminum-mischmetal alloy-coated steel chain link fabric.
2. Galvanized-steel framework.

1.3 SUBMITTALS

A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data in the form of manufacturer's technical data, specifications, and installation instructions for fence and gate posts, fabric, gates, and accessories.

C. Shop drawings showing location of fence, gates, each post, and details of post installation, extension arms, gate swing, hardware and accessories.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed at least five chain link fence projects with same material and of similar scope to that indicated for this Project with a successful construction record of in-service performance.

B. Single-Source Responsibility: Obtain chain link fences and gates, including accessories, fittings, and fastenings, from a single source.

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify layout information for fences and gates shown on the Drawings in relation to the property survey and new and existing structures. Verify dimensions by field measurements.

PART 2 - PRODUCTS

2.1 FABRIC

A. Selvage: Knuckled on both selvages.

B. Steel Chain-Link Fence Fabric: Fabricated in one-piece widths for fencing 12 feet and less in height to comply with Chain Link Fence Manufacturers Institute (CLFMI) "Product Manual" and with requirements indicated below:

1. Mesh and Wire Size: 2-inch mesh, 0.148-inch diameter (9 gage).
2. Coating: ASTM A 817, Type 2, Class 1, zinc-coated (galvanized) applied after weaving.

2.2 FRAMING

A. Type I Round Posts: Standard weight (schedule 40) galvanized-steel pipe conforming to ASTM F 1083, according to heavy industrial requirements of ASTM F 669, Group IA, with minimum yield strength of 25,000 psi, not less than 1.8 oz. of zinc per sq. ft. Type A coating inside and outside according to ASTM F 1234, as determined by ASTM A 90, and weights per foot as follows:

1. Weight:

	Actual OD	(lb/ft)	NPS Size
a.	1.315	1.68	1
b.	1.660	2.27	1-1/4
c.	1.900	2.72	1-1/2
d.	2.375	3.65	2
e.	2.875	5.79	2-1/2
f.	3.500	7.58	3
g.	4.000	9.11	3-1/2
h.	6.625	8.97	6
i.	8.625	28.55	8

B. Top Rail: Manufacturer's longest lengths (17 to 21 feet) with swedged-end or expansion-type coupling, approximately 6 inches long for joining. Provide rail ends or other means for attaching top rail securely to each gate corner, pull, and end post.

1. Round Steel: 1.660-inch OD steel pipe.

C. Steel posts for fabric heights up to 6 feet:

1. Round Line or Intermediate Posts: 1.90-inch OD steel pipe.
2. Round End, Corner, and Pull Posts: 2.375-inch OD steel pipe.

D. Steel posts for fabric heights over 6 feet:

1. Round Line or Intermediate Posts: 2.375-inch OD steel pipe.
2. Round End, Corner, and Pull Posts: 2.875-inch OD steel pipe.

E. Swing Gate Posts: Furnish posts to support single gate leaf according to ASTM F 900, sized as follows for steel and aluminum pipe posts:

1. Steel posts for fabric height of 6 feet or less and gate leaf width:

a. Up to and Including 4 Feet: 2.375-inch OD pipe weighing at least 3.11 lb per ft.
b. Over 4 to 10 Feet: 2.875-inch OD pipe weighing at least 4.64 lb per ft.

2. Steel posts for fabric height over 6 feet and gate leaf width:

a. Up to and Including 6 Feet: 2.875-inch OD pipe weighing at least 4.64 lb per ft.

2.3 FITTINGS AND ACCESSORIES

A. Material: Comply with ASTM F 626. Mill-finished aluminum or galvanized iron or steel to suit manufacturer's standards.

1. Steel and Iron: Unless specified otherwise, hot-dip galvanize pressed steel or cast-iron fence fittings and accessories with at least 1.2 oz. zinc per sq. ft. as determined by ASTM A 90.

B. Post and Line Caps: Provide weathertight closure cap for each post. Provide line post caps with loop to receive tension wire or top rail.

C. Post Brace Assembly: Manufacturer's standard adjustable brace. Use material specified below for brace, and truss to line posts with 3/8-inch-diameter rod and adjustable tightener. Provide manufacturer's standard galvanized-steel, cast-iron or cast-aluminum cap for each end.

1. Round Steel: 1.660-inch OD Type I or II steel pipe.

D. Bottom and Center Rail: Same material as top rail. Provide manufacturer's standard galvanized-steel, cast-iron or cast-aluminum cap for each end.

E. Tension or Stretcher Bars: Hot-dip galvanized steel with a minimum length 2 inches less than the full height of fabric, a minimum cross section of 3/16 inch by 3/4 inch, and a minimum of 1.2 oz. of zinc coating per sq. ft. Provide one bar for each gate and end post, and two for each corner and pull post, except where fabric is integrally woven into the post.

F. Tension and Brace Bands: 3/4-inch-wide minimum hot-dip galvanized steel with a minimum of 1.2 oz. of zinc coating per sq. ft.

1. Tension Bands: 0.074 inch thick (14 gage) minimum.
2. Brace Bands: 0.105 inch thick (12 gage) minimum.

G. Tension Wire: 0.177-inch-diameter metallic-coated steel marcelled tension wire conforming to ASTM A 824 with finish to match fabric.

H. Tie Wires: 0.106-inch-diameter (12-gage) galvanized steel with a minimum of 0.80 oz. per sq. ft. of zinc coating according to ASTM A 641, Class 3.

I. Barbed Wire Supporting Arms: Manufacturer's standard barbed wire supporting arms conforming to ASTM F626, metal and finish to match fence framework, with provision for anchorage to posts and attaching three rows of barbed wire to each arm. Supporting arms may be either attached to posts or integral with post top weather cap and must be capable of withstanding 250 lbs. down pull at the outermost end. Provide single 45 degree arm, with outward projection, for three (3) strands of barbed wire, one for each post.

J. Steel Barbed Wire: Three-strand, 0.099-inch-diameter (12 ½ gage) steel wire with 0.080-inch-diameter (14 gage), four point barbs spaced not more than 5 inches o.c.; metallic coated finish to match fabric.

2.4 GATES

A. Swing Gates: Comply with ASTM F 900.

1. Steel: Gates up to 8 feet wide:

a. Up to 6 Feet High: Fabricate perimeter frames of 1.660-inch minimum OD steel pipe or 1-1/2-inch-square galvanized-steel tubing weighing 1.84 lb per sq. ft.

2. Fabric: Same as for fence unless otherwise indicated. Secure fabric at vertical edges with tension bars and bands at top and bottom of frame with tie wires.

3. Bracing: Install diagonal cross bracing consisting of 5/16 inch diameter adjustable length truss rods on gates to ensure frame rigidity without sag and twist.

4. Barbed Wire: Extend end members of gate frames 12 inches above the top member and prepare to receive three strands of wire. Provide necessary clips for securing wire to extensions.

5. Gate Hardware: Provide galvanized hardware and accessories for each gate according to the following:

a. Hinges: Size and material to suit gate size, non-lift-off type, offset to permit 180-degree gate opening. Provide 1-1/2 pair of hinges for each leaf over 6-foot nominal height.

b. Latch: Forked type or plunger-bar type to permit operation from either side of gate, with padlock eye as an integral part of latch.

c. Gate Stops: Provide gate stops for double gates consisting of mushroom-type flush plate with anchors, set in concrete, and designed to engage a center drop rod

or plunger bar. Include a locking device and padlock eyes as an integral part of the latch, permitting both gate leaves to be locked with a single padlock.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install fence to comply with ASTM F 567. Do not begin installation and erection before final grading and/or cmu walls and concrete foundations are completed.

B. Excavation: Drill or hand-excavate (using post-hole digger) holes for posts to diameters and spacings indicated, in firm, undisturbed or compacted soil.

1. If not indicated on Drawings, excavate holes for each post to minimum diameter recommended by fence manufacturer, but not less than four times the largest cross section of post.

2. Unless otherwise indicated, excavate hole depths approximately 3 inches lower than post bottom, with bottom of posts set not less than 36 inches below finish grade surface.

C. Setting Posts on Concrete Foundations: Bolt posts, with base plates, to the exiting concrete sidewalks. . Prior to final bolting procedures, check post for vertical and top alignment, and hold in position during placement has been completed. Reference drawings for additional information.

D. Top Rails: Run rail continuously through line post caps, bending to radius for curved runs and at other posts terminating into rail end attached to posts or post caps fabricated to receive rail. Provide expansion couplings as recommended by fencing manufacturer.

E. Center Rails: Install center rails in one piece between posts and flush with post on fabric side, using rail ends and special offset fittings where necessary.

F. Brace Assemblies: Install braces at end and gate posts and at both sides of corner and pull posts. Locate horizontal braces at mid-height of fabric on fences with top rail and at two thirds fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.

G. Bottom Tension Wire: Install tension wire within 6 inches of bottom of fabric before stretching fabric and tie to each post with not less than same gage and type of wire. Pull wire taut, without sags. Fasten fabric to tension wire with 0.120-inch-diameter (11-gage) hog rings of same material and finish as fabric wire, spaced a maximum of 24 inches o.c.

H. Top Tension Wire: Install tension wire through post cap loops before stretching fabric. Pull wire taut, without sags. Fasten fabric to tension wire with 0.120-inch-diameter (11-gage) hog rings of same material and finish as fabric wire, spaced a maximum of 24 inches o.c.

I. Fabric: Leave approximately 2 inches between finish grade and bottom selvage unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Install fabric on

security side of fence, and anchor to framework so that fabric remains under tension after pulling force is released. Fabric shall be installed at the exterior and interior building kennel areas on side walls at fence areas and on the tops on the kennels, inside and outside of the building, unless otherwise indicated the plans.

J. Barbed Wire: Pull wire taut and install securely to extension arms and secure to end post or terminal arms according to manufacturer's instructions.

K. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts with tension bands spaced not over 15 inches o.c.

L. Tie Wires: Use wire of proper length to secure fabric firmly to posts and rails. Bend ends of wire to minimize hazard to persons or clothing.

1. Maximum Spacing: Tie fabric to line posts 12 inches o.c. and to rails and braces 24 inches o.c.

M. Fasteners: Install nuts for tension bands and carriage bolts on the side of the fence opposite the fabric side. Peen ends of bolts or score threads to prevent removal of nuts for added security.

3.2 ADJUSTING

A. Gates: After repeated operation of completed installation equivalent to 3 days use by normal traffic, readjust gates for optimum operating condition and safety.

END OF SECTION 02831

SECTION 05120 - STRUCTURAL STEEL

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. Metal Fabrications: Section 05500.

1.2 SUBMITTALS

A. Shop Drawings shall be submitted for review in accordance with Section 01300. Material shall not be fabricated or delivered to site before reviewed shop drawings have been returned to Contractor.

1. Erection diagrams shall show wind connections, holes or sleeves for mechanical trades and cover plates (size, location and length) as indicated on the structural drawings. All erection marks on the erection diagrams shall be cross referenced directly to shop details, indicating piece number and shop detail sheet number. Index sheets may be used as an alternative.
2. Each steel member shall be dimensionally located in plan on the erection diagrams. The size and grade of steel for each component part of the structure shall be clearly indicated. Details for bolted connections shall define the size, quantity, and grade of bolts and the number of washers required for each bolt. Each field bolted connection shall be clearly identified in the shop drawings as a friction connection. Fit up requirements for bolted connections shall be clearly detailed.
3. Welds shall be detailed to conform to the requirements of AWS A2.0, "Standard Welding Symbols." Welding procedure specifications shall be outlined in the shop drawings for all welds.

B. Test Reports or mill certificates shall be submitted for approval as specified hereinafter under "Mill Reports."

C. Mill Reports. Furnish steel mill shipping statements and certified mill reports of heat and melt numbers on steel to be used in Project.

D. Welders' Certificates. Submit certificates as specified under "welding operators qualifications".

1.3 QUALITY ASSURANCE

A. Codes and Standards. Comply with provisions of following, except as otherwise indicated.

1. AISC "Code of Standard Practice for Steel Buildings and Bridges."
2. Paragraph 4.2.1 of the above code is hereby modified by deletion of the following sentence: "This approval constitutes the Owner's acceptance of all responsibility for the design adequacy of any connections designed by the fabricator as part of his preparation of these shop drawings."
3. AISC "Specifications for Structural Steel Buildings -- Allowable Stress Design" including "Commentary" and Supplements thereto as issued.
4. "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts" approved by the Research Council on Structural Connections.

5. American Welding Society (AWS) D1.1 "Structural Welding Code - Steel."
6. ASTM A 6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use."

B. Welding Operators Qualification. Welders and welding operators shall have passed the applicable AWS qualification tests prescribed in AWS D1.0. All welding shall be performed by certified welders. Certification shall have been achieved in the twelve calendar months including and immediately preceding the date the subject welder begins work under the Contract.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Steel Shapes, Bars, Plates: ASTM A-36.

B. Anchor Bolts: ASTM A-307 nonheaded, Grade A.

C. Standard Fasteners: Bolts, nuts, washers complying with ASTM A-325, Type I.

D. Galvanizing (all exposed exterior members and plates): Shall conform to ASTM A-123, A-153, or A-525 as applicable, 1.8 oz. / sq. ft.

E. Shop Paint Primer (interior steel members and plates): Alkyd based, iron oxide; 50% minimum - volume solids. Acceptable products include "Series 4 Versare Primer" by Tnemec, "KemBond HS Primer H50 Series" by Sherwin-Williams, 5105 by Ameron or approved equal.

OR

F. Shop Paint Primer (interior steel members and plates): Alkyd based, zinc chromate pigment; 50% minimum. volume solids. Acceptable products include "Tneme-zinc 90-96" by Tnemec, "Zinc chromate Primer B 50Y-1" by Sherwin-Williams, "Dimetcote 9FT" by Ameron.

2.2 FABRICATION

A. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.

B. Shop Connections: Weld or bolt as indicated.

C. Field Connections: Weld or bolt at Contractor's option unless noted otherwise. All field welds will be continuous unless noted otherwise. Seal welds shall be provided for exterior steel field welded connections.

D. Standard Fasteners: Provide standard threaded fasteners for principal bolted connections.

E. Preparation for Other Work: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on final shop drawings. Provide threaded nuts which work. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.

F. Shop Painting: Shop paint all steelwork, except parts of steel that are to be field welded. Parts which are inaccessible after assembling shall be given two shop coats of paint.

1. Surface-Preparation. Surfaces to receive shop coat of primer shall be prepared in accordance with SSPC-Sp-3, No. 3, power tool cleaning.
2. Primer Application shall be in accordance with SSPC-Paint System Guide No. 7 to a minimum dry-film thickness of two mils.

PART 3 - EXECUTION

3.1 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

3.2 FIELD ASSEMBLY

A. General: Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces that will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

B. Erection Bolts: On exposed welded construction, tighten erection bolts, and leave in place. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds. Do not enlarge unfair holes in members by burning or by using drift pins. Ream holes that must be enlarged to admit bolts.

C. Torch Cutting: Do not use gas cutting torches in field for correcting fabrication errors. Cutting will be permitted only on secondary members that are not under stress, as acceptable to Engineer. Finish gas-cut sections equal to a sheared appearance when permitted.

D. Splices: Not permitted, except where specifically allowed on plans.

E. Field Connection Type: Slip critical.

F. Bolt Tightening: Install and tighten bolts according to "Specification for Structural Joints using ASTM A-325 and A-490 Bolts" and "Load and Resistance Factor Design Specification for Structural Joints using ASTM A-325 and A-490 Bolts" as published by the Research Council on Structural Connections using one of the following methods:

1. Turn-of-Nut.

2. Calibrated Wrench.
3. Direct-tension indicator.

G. Welded Construction: Technique of welding employed, appearance, quality of welds, methods used in correcting defective work, shall conform in workmanship to Section 3 of AWS D1.1 Structural Welding Code. Materials used and details of all joints for any work included shall comply with requirements of American Welding Code for Arc and Gas Welding in Building Construction. Welds shall be continuous unless indicated otherwise.

3.3 TOUCH-UP PAINTING

A. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas with same material as used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 8.0 mils.

3.4 FIELD QUALITY CONTROL

A. Erection Tolerances: The work in place shall comply with AISC erection specification requirements of the "Code of Standard Practice for Steel Buildings and Bridges". These tolerances are partially given as follows. Individual pieces shall be erected so that deviation from plumb, level and alignment shall not exceed 1 to 500.

B. Inspection: All material, including shop and field welding and the installation of high strength bolts, shall be subject to inspection in the shop and field by an inspection agency.

1. The Contractor shall cooperate with the inspection agency and shall furnish, free of charge, all electrical power, turning or moving of members, hoisting, staging, shanties, moving of inspection equipment and other facilities required for inspection. Testing machines, testing machine operators, and testing materials used for inspection will be furnished by the inspection agency.
2. Welding Acceptance. Dimensional tolerances for welded construction, details of welds, and quality of welds shall be in accordance with the applicable requirements of AWS D1.1 and the contract drawings. Nondestructive testing shall be by visual inspection.
3. Load Indicator Washers. Load indicator washers shall be tested in place to verify that they have been compressed sufficiently to provide the 0.015-inch gap when the load indicator washer is placed under the bolt head and the nut is tightened, and to provide the 0.005-inch gap when the load indicator washer is placed under the turned element, as required by ASTM F 959.

END OF SECTION 05120

SECTION 05500 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following metal fabrications:

1. Rough hardware.
2. Steel framing and supports for mechanical and electrical equipment.

a. Operating Room Surgical Lights.

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Shop drawings detailing fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other Sections.

1. Templates for anchors and bolts specified for installation under other sections.

C. Welding Certificates: Copies of certificates for welding procedures and personnel.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

B. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1 “Structural Welding Code - Steel”.
2. AWS D1.3 “Structural Welding code - Sheet Steel”.

1.5 PROJECT CONDITIONS

A. Field Measurements: Check actual locations of walls and other construction to which metal fabrications must fit by accurate field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

B. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Allow for trimming and fitting.

1.6 COORDINATION

A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates and directions for installing anchorages, including anchor bolts. Deliver such items to project site in time for installation.

PART 2 - PRODUCTS

2.1 FERROUS METALS

A. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

C. Steel Tubing: Product type (manufacturing method) and as follows:

1. Cold-Formed Steel Tubing: ASTM A 500.
2. Hot-Formed Steel Tubing: ASTM A 501.

D. Welding Rods and Bare Electrodes: Select according to AWS specifications for the metal alloy to be welded.

2.2 PAINT

A. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements of FS TT-P-664, selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

B. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers.

2.3 FASTENERS

A. General: Provide plated fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating, for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568, Property Class 4.6), with hex nuts, ASTM A 563 (ASTM A 563M), and, where indicated, flat washers.

C. Machine Screws: ANSI B18.6.3.

D. Anchor Bolts: ASTM F1554, Grade 36.

E. Lag Bolts: ANSI B18.2.1 (ANSI B18.2.3.8M).

F. Wood Screws: Flat head, carbon steel, ANSI B18.6.1.

G. Plain Washers: Round, carbon steel, ANSI B18.22.1 (ANSI B18.22M).

H. Lock Washers: Helical, spring type, carbon steel, ANSI B18.21.1.

I. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

1. Material: Carbon steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material: Group 1 alloy 304 or 316 stainless-steel bolts and nuts complying with ASTM F 593 (ASTM F 738M) and ASTM F 594 (ASTM F 836M).

J. Toggle Bolts: FS-FF-B-588, tumble wing type, class and style as required.

2.4 GROUT

A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior applications.

B. Products: Subject to compliance with requirements, provide one of the following:

1. Nonshrink, Nonmetallic Grouts:

a. Diamond-Crete Grout; Concrete Service Materials Co.
b. Euco N-S Grout; Euclid Chemical Co.
c. Masterflow 928 and 713; Master Builders Technologies, Inc.
d. Sealtight 588 Grout; W. R. Meadows, Inc.
e. Sonogrout 14; Sonneborn Building Products--ChemRex, Inc.

2.5 FABRICATION, GENERAL

A. Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated

or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.

B. Shear and punch metals cleanly and accurately. Remove burrs.

C. Ease exposed edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.

E. Form connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

F. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

G. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

2.6 ROUGH HARDWARE

A. Fabricate items to sizes, shapes, and dimensions required. Furnish malleable-iron washers for heads and nuts that bear on wood structural connections, and furnish steel washers elsewhere.

2.7 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports for applications indicated that are not a part of structural steel framework as required to complete the Work.

B. Fabricate units to sizes, shapes, and profiles indicated and required to receive other adjacent construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.

1. Equip units with integrally welded anchors for casting into concrete.

    a. Except as otherwise indicated, space anchors 24 inches (600 mm) o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inches (32 mm) wide by 1/4 inch (6 mm) thick by 8 inches (200 mm) long.

2.8 FINISHES, GENERAL

A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applying and designing finishes.

B. Finish metal fabrications after assembly.

2.9 STEEL AND IRON FINISHES

A. Galvanizing: For those items indicated for galvanizing, apply zinc coating by the hot-dip process complying with the following requirements:

1. ASTM A 153 for galvanizing iron and steel hardware.
2. ASTM A 123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299 inch (0.76 mm) thick or thicker.

B. Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:

1. Interiors (SSPC Zone 1A): SSPC-SP 3 "Power Tool Cleaning."

C. Apply shop primer to uncoated surfaces of metal fabrications. Comply with requirements of SSPC-PA 1 "Paint Application Specification No. 1" for shop painting.

1. Strip paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installing anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete construction. Coordinate delivery of such items to Project site.

3.2 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction. Include threaded

fasteners for concrete inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete construction.

D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop-welded because of shipping size limitations.

E. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and contour of welded surface matches those adjacent.

3.3 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a 2.0-mil (0.05-mm) minimum dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of the shop paint on miscellaneous metal is specified in Division 9 Section "Painting."

END OF SECTION 05500

SECTION 07511 - PATCHING BUILT-UP ROOFING

PART 1 - GENERAL

SYSTEM DESCRIPTION

Work under this Section includes patching of the existing SBS Modified Bituminous Membrane Roof System due to new roof penetrations as required by work under this Contract. All work shall be in accordance with the recommendations of NRCA, SMACNA

SUBMITTALS

Manufacturer's Data. Submit for review brochures containing complete manufacturer's data and installation procedures for materials to be used in work of this Section.

SITE CONDITIONS

Apply roofing in dry weather. Ambient temperature shall be at least 40 deg. F and rising.

PART 2 - PRODUCTS

BUILT-UP ROOFING SYSTEM

All roofing materials shall match existing.

Walkway Pads: Mineral-granule-surfaced, reinforced asphaltic composition, slip-resisting pads, manufactured as a traffic pad for foot traffic and acceptable to roofing system manufacturer.

Pad Size: 36” x 72” x ½”.

METAL FLASHING

Galvanized steel, Kynar finished, 24 gage with all joints riveted and caulked. Flange shall be continuous. The color shall match existing.

PART 3 - EXECUTION

PREPARATION

Cut out and remove sections of the existing built-up roofing plies in an area approximately 36 inches in all directions from the new penetrations. Carefully cut the penetration to minimize the opening size. Seal the penetration to the existing roof using a minimum of three base plies of roofing felts embedded in and covered with hot applied bitumen. The final ply shall be granular surfaced.

ROOF MEMBRANE INSTALLATION

General: Install modified bituminous membrane over area to receive roofing, according to manufacturer's written instructions. Extend modified bituminous membrane over and terminate

beyond cants.

Unroll sheet and allow it to relax for the minimum time period required by manufacturer.

Application: Adhere to substrate in a solid mopping of hot roofing asphalt applied at rate required by roofing system manufacturer.

Two-Ply, Modified Bituminous Membrane: Install 2 plies of modified bituminous membrane, consisting of a base ply and a finish ply, starting at low point of roofing system.

Base- and Finish-Ply Application: Adhere each ply to substrate in a solid mopping of hot roofing asphalt, applied within temperature range and at rate required by roofing system manufacturer.

Laps: Accurately align sheets, without stretching, and maintain uniform side and end laps. Stagger end laps. Completely bond and seal laps, leaving no voids.

Repair tears and voids in laps and lapped seams not completely sealed.
Apply granules, while asphalt is still hot, to cover asphalt bead exuded at laps.

Install modified bituminous membranes with side laps shingled with slope of roof deck where possible.

FLASHING AND STRIPPING INSTALLATION

Install base flashing over cant strips and other sloping and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to roofing system manufacturer's written instructions and as follows:

Prime substrates with asphalt primer if required by roofing system manufacturer.

Backer Sheet Application: Install base-sheet backer / stripping ply and adhere to substrate in a uniform mopping of hot roofing asphalt.

Base Flashing Application: Torch apply metal surfaced cap flashing to substrate.

Extend base flashing up the wall a minimum of 8 inches (200 mm) above roof membrane and 4 inches (100 mm) onto field of roof membrane. Walls, curbed penetrations, etc. shall be waterproofed using a minimum total of four (4) layers of SBS membrane at junctures of the roof deck to the penetration. The four (4) layered construction consists of SBS Interply base layer, SBS reinforcing Interply layer, SBS Cap Sheet layer and Flashing Sheet layer.

WALKWAY INSTALLATION

Walkway Pads: Install walkway pads using units of size indicated and according to walkway pad manufacturer's written instructions.

Set walkway pads in cold-applied adhesive.

Install walkway pads under pipe supports and around the new HVAC equipment.

END OF SECTION 07511

SECTION 09900 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A. Surface preparation and field painting of the following:

1. Exposed new exterior items and surfaces as scheduled.
2. Exposed new interior items and surfaces as scheduled.

B. General: Paint exposed surfaces, except where the finish or paint schedules indicate that a surface or material is not to be painted or is to remain natural. If the finish or paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color or finish, the Architect will select from standard colors and finishes available.

1.3 PAINTING NOT INCLUDED IN THIS SECTION

A. Shop Priming: Unless otherwise specified, shop priming of ferrous metal items is included under the various sections for structural steel, miscellaneous metal items, hollow metal work, and shop-fabricated or factory-built mechanical and electrical equipment or accessories.

B. Pre-Finished Items: Unless otherwise indicated, do not include painting when factory-finishing or installer-finishing is specified for such item as (but not limited to) finished mechanical and electrical equipment, including light fixtures, switchgear, and distribution cabinets. However, windows, air distribution devices, and panel boards exposed in habitable areas shall be field painted to match color of adjacent surfaces. Prefinished items shall be field "touch-up" painted to repair any damage.

C. Concealed Surfaces: Unless otherwise indicated, painting is not required on wall or ceiling surfaces in concealed areas and inaccessible areas, such as foundation spaces, furred areas, pipe spaces, and duct shafts, as applicable to this Project.

D. Finished Metal Surfaces: Metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze, and similar finished materials will not require finish painting, except as otherwise specified.

E. Operating Parts and Labels: Do not paint any moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sensing devices, motor and fan shafts, unless otherwise indicated.

1. Do not paint over any code-required labels, such as UL, FM, WHI, or any equipment identification, performance rating name, or nomenclature plates.

1.4 MECHANICAL ITEMS

A. Shall be painted as specified hereinafter depending upon paint condition of item upon its arrival at Project Site.

B. Pre-Finished: Refer to paragraph above entitled "Pre-Finished Items" for other prefinished item.

C. Primed: Refer to paragraph above entitled "Shop Priming". Finish coats shall be as specified hereinafter under Ferrous Metals.

D. Bare Metal Objects shall be painted as specified hereinafter under Ferrous Metals. Duct throats behind all grilles and louvers shall be given a coat of metal primer and one coat of a flat black alkyd paint.

E. Insulated Items: Exposed interior insulated items such as insulated piping (except vinyl surfaces) shall be given one coat wall primer or sealer and 2 coats alkyd flat wall paint. Exposed exterior insulated item shall be given one coat sizing and two coats aluminum paint.

1.5 SUBMITTALS

A. Product Data: Contractor shall verify in writing that he intends to apply proprietary products listed in Paint Schedule, or submit for approval a list of comparable materials of another listed approved Manufacturer. This submittal shall include full identifying product names, paint label analysis and application instructions for each material proposed for use.

B. Samples and Color Schedule: The Contractor shall submit for approval, prior to starting of painting and finishing, the manufacturer's complete range of all color and finish samples available for each material he proposes to use.

1. The Engineer will then prepare a color schedule and give it to the Contractor for use on this Project.

1.6 HANDLING AND STORAGE

A. Materials shall be delivered in original sealed containers that plainly show designated name, formula, or specification number, batch number, color, date of manufacturer, manufacturer's directions, and name of manufacturer.

B. Store materials in a single place. Storage place shall be kept neat and clean. Remove soiled or used rags, waste and trash from building every night, and take every precaution to avoid danger of fire.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Water Base Paints shall not be applied when temperature of surface to be painted and the surrounding air temperatures are below 50 degrees F, unless otherwise permitted by paint manufacturer's printed instructions.

B. Solvent-thinned Paints shall not be applied when temperature of surface to be painted and the surrounding air temperatures are below 45 degrees F, unless otherwise permitted by paint manufacturer's printed instructions.

C. Exterior: Do not apply paint in snow, rain, fog, or mist, or when relative humidity exceeds 85%; or to damp or wet surfaces, unless otherwise permitted by paint manufacturer's printed instructions. Painting may be continued during inclement weather only if the areas and surfaces to be painted are enclosed and heated within the temperature limits specified by the paint manufacturer during application and drying periods.

1.8 SCHEDULING

A. The work of this Section shall be scheduled and coordinated with trades and shall not proceed until other work and/or Project conditions are as required to achieve satisfactory results. Contractor shall examine Specifications for various other trades and materials and shall thoroughly familiarize himself with their provisions regarding paint.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. For purposes of designating type and quality of work under this Section, paint schedules are based on products manufactured or furnished by the following manufacturers, except as noted specifically otherwise.

1. Devoe & Raynolds Co.
2. Benjamin Moore.
3. Sherwin-Williams.

2.2 COLORS

A. Shall be selected by Engineer and Owner from manufacturer's standard range. Contractor shall be furnished a color schedule containing approved color selections.

1. P-1 Latex Block Filler:

a. Devoe: Acrylic Latex Bloxfil #52901.
b. Moore: Moorcraft Block Filler #173.
c. S-W: Pro-mar Block Filler B25W25.

2. P-2 Alkyd, Ferrous Metal Primer:

    a. DeVoe: #41820 Bar-ox.
    b. Moore: Retardo Metal Primer #163.
    c. S-W: Zinc Chromate Primer B50Y1.

3. P-3 Galvanized Metal Primer:

    a. DeVoe: #13201 Galvanized Metal Primer.
    b. Moore: Ironclad Galvanized Metal Latex Primer #155.
    c. S-W: Galvite B50W3.

4. P-8 Interior Latex Primer:

    a. DeVoe: #50801 Wonder Tone Primer.
    b. Moore: Moore's Latex Quick-Dry Prime Seal #201.
    c. S-W: Pro-Mar 200 Latex Wall Primer B28W200.

5. P-10 Interior Metal Primer:

    a. DeVoe: Bar-Ox Primer, #41820.
    b. Moore: Ironclad Retardo Rust-Inhibitive Paint #163.
    c. S-W: Kem Kromik Metal Primer B50N2/B50W1.

6. P-11 Interior Alkyd Undercoater:

    a. DeVoe: #8801 Alkyd Enamel Undercoat.
    b. Moore: Moore's Alkyd Enamel Underbody #217.
    c. S-W: Wall and Wood Primer B49W2.

7. F-2 Exterior Alkyd Gloss Enamel:

    a. DeVoe: #581XX Bar-Ox Gloss Enamel.
    b. Moore: Impervo High-Gloss Enamel #133.
    c. S-W: Industrial Enamel B-54 Series.

8. F-8 Interior Latex, Semi-gloss:

    a. DeVoe: #525XX Wonder-Speed Acrylic Latex.
    b. Moore: Moorcraft Latex, Semi-gloss Enamel.
    c. S-W: Pro Mar 200 Latex Semi-gloss B31W200.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Before starting any work, examine surfaces to receive paint finishes for defects which cannot be corrected by the procedures specified under "Preparation of Surfaces" and which might prevent satisfactory results. Work shall not proceed until such damages are corrected. Commencing of

work constitutes acceptance of surfaces, and thereafter Contractor shall be fully responsible for satisfactory work.

3.2 PROTECTION

A. Dissimilar Areas: Protect adjacent areas and installation by use of drop cloths or other approved precautionary measures.

B. Hardware and Accessories: Remove and protect hardware, accessories, device plates, lighting fixtures, factory finished work, and similar items; or provide ample in-place protection. Upon completion of each space, carefully replace removed items. Cover permanent labels until final coat is dry.

3.3 PREPARATION OF SURFACES

A. General: Clean surfaces to be painted, free of loose dirt, dust, prior to paint application.

B. Ferrous Metal:

1. Uncoated: Unprimed ferrous metal shall be thoroughly cleaned of rust, mill scale, oil, grease, encrustation and other foreign matter, using rotary wire brushes, solvents and/or sand-blasting as necessary. Pits shall be cleaned down to bright metal.
2. Shop Coated: Thoroughly remove all oil, grease, dirt and other foreign matter. All field connections, welds, soldered joints, and abraded areas shall be cleaned to bright metal and spot coated with same material used for shop coat.
3. Galvanized: Treat galvanized metal surfaces chemically with compound designed for this purpose, as per manufacturer's directions, prior to applying first coat of paint.

3.4 APPLICATION

A. Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for the type of material being applied.

B. Uniform suspension of pigments shall be maintained during application. Each coat of paint shall be applied so dry film shall be of uniform thickness and free from runs, drops, ridges, waves, pinholes or other voids, laps, brush marks, and variations in color, texture, and finish. Hiding shall be complete. Rollers for applying paints and enamels shall be of a type designed for the coating to be applied and the surface to be coated. Special attention shall be given to insure that all edges, corners, crevices, welds, and rivets receive a film thickness equal to that of adjacent painted surfaces. Paint shall be applied only to surfaces that are complete free of moisture as determined by sight or touch.

C. Cover surfaces to be stained with uniform stain coat; wipe off as required.

D. Coats shall be thoroughly dry before applying succeeding coats.

E. Sealers or stains on transparent finish wood shall be brushed or rubbed. Spraying shall not be permitted for stain or sealers.

F. Minimum Coating Thickness: Apply materials no thinner than the manufacturers recommended spreading rate. Provide the total dry film thickness (DFT) of the entire system as recommended by the manufacturer.

3.5 CLEANING

A. Cloths and cotton waste that might constitute a fire hazard shall be placed in closed metal containers or destroyed at the end of the day. Upon completion of work, staging, scaffolding, and containers shall be removed from site or destroyed in an approved manner. Paint spots, oil, or stains upon adjacent surfaces shall be removed and entire job left clean and acceptable.

3.6 EXISTING SURFACES

A. Where patchwork is required because of other trades breaking into existing walls and ceilings, e.g., mechanical and electrical, repaint entire walls to nearest corners and floor to ceiling, or entire ceiling as follows: one coat on existing surface not altered, three coats where required. Type and color of paint shall match finish on existing adjacent surfaces.

3.7 PAINTING SCHEDULE (New Surfaces Only)

A. Coating Identification:

1. Alpha-numeric identification of coatings in the following schedule refers to corresponding identification in the "Products" part of this Section.

EXTERIOR PAINTING SCHEDULE

Substrate: Ferrous Metal
Area: All (except galvanized)
Coat 1: P-2
Coat 2: F-2
Coat 3: F-2
(Note: Apply one coat of F-2 to factory finished windows)

Substrate: Ferrous Metal, Galvanized
Area: Galvanized Surfaces
Coat 1: P-3
Coat 2: F-2
Coat 3: F-2

INTERIOR PAINTING SCHEDULE

Substrate: Ferrous Metal
Area: All
Coat 1: P-10
Coat 2: F-2
Coat 3: F-2

Substrate: Brick (Patching painted brick)
Area: Walls
Coat 1: P-1
Coat 2: F-8
Coat 3: F-8

END OF SECTION 09900

SECTION 15050 - BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Transition fittings.
3. Dielectric fittings.
4. Mechanical sleeve seals.
5. Sleeves.
6. Escutcheons.
7. Grout.
8. Mechanical demolition.
9. Equipment installation requirements common to equipment sections.
10. Painting and finishing.
11. Supports and anchorages.
12. Access panels.
13. Motor starters.

1.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. The following are industry abbreviations for rubber materials:

1. EPDM: Ethylene-propylene-diene terpolymer rubber.
2. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Dielectric fittings.
2. Mechanical sleeve seals.
3. Escutcheons.

B. Shop Drawings: Detail fabrication and installation for metal supports and anchorage for mechanical materials and equipment.

C. Coordination Drawings: Submit, as soon as feasible after award of contract, all mechanical room and exterior equipment layouts at a scale not less than 1/4 inch=1 foot showing the layout of the actual equipment to be used. Detail major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Show space requirements for installation and access. Indicate if sequence and coordination of installations are important to efficient flow of the Work. Include the following:

1. Planned piping layout, including valve and specialty locations and valve-stem movement.
2. Clearances for installing and maintaining insulation.
3. Clearances for servicing and maintaining equipment, accessories, and specialties, including space for disassembly required for periodic maintenance.
4. Equipment and accessory service connections and support details.
5. Exterior wall.
6. Sizes and location of required concrete pads and bases.
7. Floor plans and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.

1.5 QUALITY ASSURANCE

A. Equipment Selection: Equipment of higher electrical characteristics, physical dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are increased. Costs for these increases will be the responsibility of the contractor. No additional costs will be approved for these increases. If minimum energy ratings or efficiencies of equipment are specified, equipment must meet design and commissioning requirements.

B. Drawings: The Mechanical Drawings show the general arrangement of all piping, equipment, and appurtenances, and shall be followed as closely as actual building construction and the work of other trades will permit. The Mechanical work shall conform to the requirements shown on all the Drawings. Because of the small scale of the Mechanical Drawings, it is not possible to indicate all offsets, fittings, and accessories which may be required. The Contractor shall investigate the structural and finish conditions and other building components affecting the work and shall arrange his work accordingly, providing such offsets, fittings, and accessories as

may be required to meet such conditions. No extras will be approved for required additional offsets and fittings. Any offsets or additional fittings required to coordinate mechanical systems with existing conditions and other trades, or that are necessary for the complete installation of the system, including modifications to shop or off-site fabricated piping and/or ductwork, all shall be provided by the Contractor at no additional cost to the Owner.

C. Comply with International Building Code.

D. Comply with International Mechanical Code.

E. Comply with Louisiana State Plumbing Code.

F. Comply with Louisiana State Energy Code.

G. Comply with all applicable NFPA Codes, particularly the following: NFPA 90A, 90B, and 101.

H. Comply with all applicable local codes.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and prevent entrance of dirt, debris, and moisture.

B. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, if stored inside.

C. Protect flanges, fittings, and piping specialties from moisture and dirt.

1.7 SEQUENCING AND SCHEDULING

A. Coordinate mechanical equipment installation with other building components and existing conditions.

B. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.

C. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning before closing in building.

D. Coordinate requirements for access panels and doors if mechanical items requiring access are concealed behind finished surfaces.

E. Coordinate installation of identifying devices after completing covering and painting, if devices are applied to surfaces. Install identifying devices before installing acoustical ceilings and other concealment.

1.8 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. Electrical Characteristics for Mechanical Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. No additional costs will be approved for these modifications. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.10 COORDINATION

A. Coordinate installation of required supporting devices.

B. Coordinate requirements for access panels and doors for mechanical items requiring access that are concealed behind finished surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by firms regularly engaged in the manufacture of products required, whose products have been in satisfactory use in similar service.

2.2 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 15 Piping Sections and "Pipe and Fitting Material Schedule" on the Drawings for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual Division 15 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

E. Brazing Filler Metals: AWS A5.8, BAg1, silver alloy.

F. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

G. Solvent Cements: Manufacturer's standard solvent cements for the following:

1. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

2.4 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, flanged, solder-joint, plain, or weld-neck end connections that match piping system materials and isolate joined dissimilar metals to prevent galvanic action and stop corrosion.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig (2070-kPa) minimum working pressure at 225 degrees F (107 degrees C).

2.5 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

2.6 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.

1. Finish: Polished chrome-plated.

C. Split-Plate, Stamped-Steel Type: With concealed or exposed-rivet hinge, set screw, and chrome-plated finish.

D. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

2.7 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

2.8 ACCESS PANELS

A. Access Panels: Flush metal hinged access panel and frame (type as required for surface encountered), prime coat finish, and key actuated cylinder lock.

B. Access Panels: Minimum size 12 inch x 12 inch. Locate over device to be serviced.

2.9 MOTOR STARTERS

A. Square D 8536, General Electric CR206, Cutler-Hammer Freedom Series, or approved equivalent (except where reduced voltage type are specified) with overload protection in each phase (with correctly sized heaters) in NEMA Type I enclosure unless noted otherwise, reset button in cover, and all of the same manufacturer. Provide auxiliary contacts for interlocking where required. Coordinate auxiliary contact needs with Division 15 Section 15971, "Building Management and Control Systems." Include HOA switch and pilot light in cover. Provide control power step-down transformer with sufficient additional capacity to handle essential control requirements (coordinate with Division 15 Section 15971, "Building Management and Control Systems").

PART 3 - EXECUTION

3.1 MECHANICAL DEMOLITION

A. Refer to Division 01 Section, "Cutting and Patching" and Division 02 Section, "Selective Demolition" for general demolition requirements and procedures.

B. Disconnect, demolish, and remove mechanical systems, equipment, and components indicated to be removed.

1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
3. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
4. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
5. Equipment to Be Removed: Disconnect and cap services and remove equipment.
6. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
7. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 15 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Extruded-tee connections are not acceptable.

K. Weld-o-let taps are not acceptable as substitutes for tee fittings.

L. Install piping to allow application of insulation.

M. Select system components with pressure rating equal to or greater than system operating pressure.

N. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:

1. New and Existing Piping:

    a. Bare or Insulated Piping at Ceiling or Wall Penetrations in Finished Spaces: Split-casting, cast-brass type with polished chrome-plated finish.
    b. Bare Piping in Unfinished Service Spaces: Split-plate, stamped-steel type with concealed or exposed-rivet hinge and set screw clips.
    c. Bare Piping in Equipment Rooms: Split-plate, stamped-steel type with set screw clips.
    d. Bare Piping at Floor Penetrations in Equipment Rooms: Split-casting, floor-plate type.

O. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.

    a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches (50 mm) above finished floor level.

2. Install sleeves that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

    a. Steel Pipe Sleeves: For pipes smaller than NPS 6 (DN 150).
    b. Steel Sheet Sleeves: For pipes NPS 6 (DN 150) and larger, penetrating gypsum-board partitions.

P. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Install steel pipe for sleeves smaller than 6 inches (150 mm) in diameter.
2. Install cast-iron "wall pipes" for sleeves 6 inches (150 mm) and larger in diameter.
3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve.

Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

Q. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials.

R. Verify final equipment locations for roughing-in.

S. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.3 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements, Division 15 Sections, and Schedules on the drawings, specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join pipe and fittings according to the following:

1. PVC Pressure Piping: ASTM D 6272.
2. PVC Nonpressure Piping: ASTM D 2855.

3.4 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.
3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.5 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

D. Install equipment to allow right of way for piping installed at required slope.

E. Manufacturer's Installation and Operating Instructions: All equipment and material shall be installed and operated in strict accord with manufacturer's "Installation and Operation Instructions." The manufacturer's installation instructions shall become part of this specification, and shall take precedence over and/or supplement any specification herein and as shown and/or described on plans. All individual items of equipment and components thereof shall be 100 percent accessible for repair, removal, or replacement without functional impairment or dismantling of any adjoining major surfaces or assemblies.

F. Electrical Work: Wherever equipment requiring electrical connection is specified, all wiring shall be furnished and installed under Division 16 of the Specifications. Motor starters, starting switches, protective devices, and other means for the operation and control of equipment shall be furnished under the various mechanical sections, and installed and electrically connected complete under Division 16 unless otherwise specifically noted, except that control devices that are installed in or on ducts, piping, or mechanical equipment shall be mounted under Division 15. If equipment is furnished requiring power wiring different from that indicated on the Electrical Drawings, the Contractor furnishing the equipment shall be responsible for any required revisions and pay any additional costs connected therewith. Wiring revisions shall be submitted to the Engineer for approval prior to installation.

1. Motor starters shall be provided for each poly phase motor and for single phase motors requiring automatic control. See Motor Control Center Schedule on Electrical Drawings for starters that will be provided under Division 16. Additional disconnects required by

the National Electrical Code shall be furnished, installed, and connected under Division 16 of the specifications.

2. Contractors furnishing items to be wired shall provide adequate wiring diagrams.
3. Temperature control wiring is included in Division 15.

3.6 PAINTING

A. Painting of mechanical systems, equipment, and components is specified in Division 9.

B. Damage and Touch-Up: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.7 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.

B. Field Welding: Comply with AWS D1.1.

3.8 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor mechanical materials and equipment.

B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.

C. Attach to substrates as required to support applied loads.

3.9 GROUTING

A. Mix and install grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

3.10 MISCELLANEOUS

A. Services: Services as indicated.

B. The Contractor shall, before submitting a proposal, verify the location, depth, size, and pressure or grade of existing lines to which he is to make connections and shall include in his bid the cost of any required revisions. If for any reason conditions appear that will adversely affect the proper installation and operation of the systems, such conditions shall be reported to the Engineer in writing for his decision ten days prior to bid date. All cutting and patching of paving, etc. required for connection to existing piping lines shall be paid for or provided by the Contractor. Locations of plumbing lines are shown in accordance with data provided by the Owner. The points of connection to the existing piping are approximate only and shall be verified by each bidder. Each bidder shall include adequate funds in his bid price to cover all cost of connections to existing piping regardless of exact location, and shall hold the Owner harmless as to additional costs or extras regarding those connections.

C. Access Panels: Provide access panels as indicated. In addition, provide access panels for each concealed item requiring service or adjustment that would otherwise be inaccessible. Access panel locations shown on drawings are approximate. Exact location shall be verified with the Engineer prior to installation.

END OF SECTION 15050

SECTION 15055 - MOTORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes basic requirements for factory-installed and field-installed motors.

B. Related Sections include the following:

1. Division 15 Sections for application of motors and reference to specific motor requirements for motor-driven equipment.

1.3 SUBMITTALS

A. Product Data for Field-Installed Motors: For each type and size of motor, provide nameplate data and ratings; mounting arrangements; size, type, and location of winding terminations; conduit entry and ground lug locations; and information on coatings or finishes.

B. Operation and Maintenance Data: For field-installed motors to include in emergency, operation, and maintenance manuals.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

1.5 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices. Provide motors that are:

1. Designed and labeled for use with variable frequency controllers, and suitable for use throughout speed range without overheating.
2. Matched to torque and horsepower requirements of the load.
3. Matched to ratings and characteristics of supply circuit and required control sequence.

PART 2 - PRODUCTS

2.1 MOTOR CHARACTERISTICS

A. Motors 1/2 HP and Larger: Three phase, or as indicated.

B. Motors Smaller Than 1/2 HP: Single phase.

C. Frequency Rating: 60 Hz.

D. Voltage Rating: NEMA standard voltage selected to operate on nominal circuit voltage to which motor is connected.

E. Duty: Continuous duty at ambient temperature of 105 degrees F (40 degrees C) and at altitude of 3300 feet (1005 meters) above sea level.

F. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

G. Enclosure: Open dripproof, unless otherwise indicated.

2.2 POLYPHASE MOTORS

A. Description: NEMA MG 1, Design B, medium induction motor.

B. Energy-Efficient Design: All motors.

1. Comply with Louisiana Energy Code.
2. Comply with EPACT.

C. Stator: Copper windings, unless otherwise indicated.

1. Multispeed motors shall have separate winding for each speed.

D. Rotor: Squirrel cage, unless otherwise indicated.

E. Bearings: Double-shielded, prelubricated ball bearings suitable for radial and thrust loading.

F. Temperature Rise: Match insulation rating, unless otherwise indicated.

G. Insulation: Class F, unless otherwise indicated.

2.3 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

A. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.

1. Designed with critical vibration frequencies outside operating range of controller output.

2. Temperature Rise: Matched to rating for Class B insulation.
3. Insulation: Class H.
4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.
5. Comply with MG1-31.

2.4 SINGLE-PHASE MOTORS

A. Type: One of the following, to suit starting torque and requirements of specific motor application:

1. Permanent-split capacitor.

B. Shaded-Pole Motors: For motors 1/20 hp and smaller only.

C. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

D. Bearings: Ball type for belt-connected motors and other motors with high radial forces on motor shaft; sealed, prelubricated-sleeve type for other single-phase motors.

PART 3 - EXECUTION

3.1 MOTOR INSTALLATION

A. Anchor each motor assembly to base, adjustable rails, or other support, arranged and sized according to manufacturer's written instructions. Attach by bolting. Level and align with load transfer link.

3.2 FIELD QUALITY CONTROL

A. Prepare for acceptance tests as follows:

1. Run each motor with its controller. Demonstrate correct rotation, alignment, and speed at motor design load.
2. Test interlocks and control features for proper operation.
3. Verify that current in each phase is within nameplate rating.

3.3 CLEANING

A. After completing equipment installation, inspect unit components. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.

B. Clean motors, on completion of installation, according to manufacturer's written instructions.

END OF SECTION 15055

SECTION 15060 - HANGERS AND SUPPORTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes hangers and supports for mechanical system piping and equipment.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society for the Valve and Fittings Industry.

B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.4 SUBMITTALS

A. Product Data: For each type of pipe hanger, channel support system component, and thermal-hanger shield insert indicated.

B. Welding Certificates: Copies of certificates for welding procedures and operators.

1.5 QUALITY ASSURANCE

A. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Firms regularly engaged in manufacture of supports and hangers, of types and sizes required, whose products have been in satisfactory use in similar service.

2.2 MANUFACTURED UNITS

A. Pipe Hangers, Supports, and Components: MSS SP-58, factory-fabricated components. Refer to "Hanger and Support Applications" Article in Part 3 for where to use specific hanger and support types.

1. Nonmetallic Coatings: On hangers for electrolytic protection where hangers are in direct contact with copper tubing.

2.3 MISCELLANEOUS MATERIALS

A. Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.

B. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars, black and galvanized.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

A. Specific hanger requirements are specified in Sections specifying equipment and systems.

B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Specification Sections.

C. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

1. Adjustable Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30 (DN15 to DN750).

D. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20 (DN20 to DN500).
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20 (DN20 to DN500), if longer ends are required for riser clamps.

E. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 degrees F (49 to 232 degrees C) piping installations.
3. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.

F. Building Attachments: Except as otherwise indicated, provide factory-fabricated building attachments complying with ANSI/MSS SP-58, selected by Installer to suit building substrate conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size of building attachments to suit hanger rods.

G. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

1. Protection Shields (MSS Type 40): Of length recommended by manufacturer to prevent crushing insulation.

H. Thermal-Hanger Shield Inserts:

1. Description: 100-psig- (690-kPa-) minimum, compressive-strength insulation insert encased in sheet metal shield.
2. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with vapor barrier.
3. Insulation-Insert Material for Hot Piping: ASTM C 552, Type II cellular glass.
4. For Hangers and Clamped Systems: Insert and shield shall cover entire circumference of pipe.
5. Insert Length: Extend 2 inches (50 mm) beyond sheet metal shield for piping operating below ambient air temperature.

3.2 HANGER AND SUPPORT INSTALLATION

A. Pipe Hanger and Support Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure. All hangers for equipment and piping are to be supported from building structure even if structural enhancements to roof support is required.

B. Install building attachments within concrete slabs or attach to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, and expansion joints, and at changes in direction of piping.

C. Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

D. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

E. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

F. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

G. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9, "Building Services Piping," are not exceeded.

H. Do not use wire or perforated metal to support piping, and do not support piping from other piping.

I. Support vertical piping at each floor and roof.

J. Insulated Piping: Comply with the following:

1. All hangers and supports shall be external of insulation.
2. Install MSS SP-58, Type 40 protective shields on all insulated piping. Shields shall span arc of 180 degrees.
3. Shield Dimensions for Pipe: Not less than the following:

a. NPS 1/4 to NPS 3-1/2 (DN8 to DN90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.
b. NPS 4 (DN100): 12 inches (305 mm) long and 0.06 inch (1.52 mm) thick.
c. NPS 5 and NPS 6 (DN125 and DN150): 18 inches (457 mm) long and 0.06 inch (1.52 mm) thick.
d. NPS 8 to NPS 14 (DN200 to DN350): 24 inches (610 mm) long and 0.075 inch (1.91 mm) thick.

3.3 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure above or to support equipment above floor.

3.4 METAL FABRICATION

A. Cut, drill, and fit miscellaneous metal fabrications for heavy-duty steel trapezes and equipment supports.

B. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

C. Any vertical structural members required to form overhead attachments for hangers or equipment supports shall be located adjacent to walls and any horizontal members be adjacent to the roof structure.

3.5 ADJUSTING

A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

3.6 PAINTING

A. Touching Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 9 Section "Painting."

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint.

END OF SECTION 15060

SECTION 15075 - MECHANICAL IDENTIFICATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following mechanical identification materials and their installation:

1. Equipment nameplates.
2. Equipment markers.
3. Equipment signs.
4. Access panel and door markers.
5. Pipe markers.
6. Valve tags.
7. Valve schedules.
8. Warning tags.
9. Underground-type plastic line markers.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Valve numbering scheme.

D. Valve Schedules: For each piping system. Furnish extra copies (in addition to mounted copies) to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. ASME Compliance: Comply with ASME A13.1, "Scheme for the Identification of Piping Systems," for letter size, length of color field, colors, and viewing angles of identification devices for piping.

1.5 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with location of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT IDENTIFICATION DEVICES

A. Equipment Nameplates: Metal, with data engraved or stamped, for permanent attachment on equipment.

1. Data:

    a. Manufacturer, product name, model number, and serial number.
    b. Capacity, operating and power characteristics, and essential data.
    c. Labels of tested compliances.

2. Location: Accessible and visible.
3. Fasteners: As required to mount on equipment.

B. Equipment Markers: Engraved, color-coded laminated plastic. Include contact-type, permanent adhesive.

1. Terminology: Match schedules as closely as possible.
2. Data:

    a. Name and plan number.
    b. Equipment service.

3. Size: 2-1/2 by 4 inches (64 by 100 mm) for control devices, dampers, and valves; 4-1/2 by 6 inches (115 by 150 mm) for equipment.

C. Equipment Signs: Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.

1. Data: Instructions for operation of equipment and for safety procedures.
2. Engraving: Manufacturer's standard letter style, of sizes and with terms to match equipment identification.
3. Thickness: 1/16 inch (1.6 mm) for units up to 20 sq. in. (130 sq. cm) or 8 inches (200 mm) in length, and 1/8 inch (3.2 mm) for larger units.
4. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.

D. Access Panel and Door Markers: 1/16 inch (1.6 mm) thick, engraved laminated plastic, with abbreviated terms and numbers corresponding to identification. Provide 1/8 inch (3.2 mm) center hole for attachment.

1. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.

2.2 PIPING IDENTIFICATION DEVICES

A. Manufactured Pipe Markers, General: Preprinted, color-coded, with lettering indicating service, and showing direction of flow.

1. Colors: Comply with ASME A13.1, unless otherwise indicated.
2. Lettering: Use piping system terms indicated and abbreviate only as necessary for each application length.
3. Pipes with OD, Including Insulation, Less Than 6 Inches (150 mm): Full-band pipe markers extending 360 degrees around pipe at each location.
4. Pipes with OD, Including Insulation, 6 Inches (150 mm) and Larger: Either full-band or strip-type pipe markers at least three times letter height and of length required for label.
5. Arrows: Integral with piping system service lettering to accommodate both directions; or as separate unit on each pipe marker to indicate direction of flow.

B. Pretensioned Pipe Markers: Precoiled semirigid plastic formed to cover full circumference of pipe and to attach to pipe without adhesive.

C. Shaped Pipe Markers: Preformed semirigid plastic formed to partially cover circumference of pipe and to attach to pipe with mechanical fasteners that do not penetrate insulation vapor barrier.

D. Plastic Tape: Continuously printed, vinyl tape at least 3 mils (0.08 mm) thick with pressure-sensitive, permanent-type, self-adhesive back.

1. Width for Markers on Pipes with OD, Including Insulation, Less Than 6 Inches (150 mm): 3/4 inch (19 mm) minimum.
2. Width for Markers on Pipes with OD, Including Insulation, 6 Inches (150 mm) or Larger: 1-1/2 inches (38 mm) minimum.

E. Underground-Type Plastic Line Marker:

1. General: Manufacturer's standard permanent, bright-colored, continuous-printed plastic tape, intended for direct-burial service; not less than 6" wide x 4 mils thick. Provide tape with printing which most accurately indicates type of service of buried pipe. Provide detectable type tape for natural gas piping.

2.3 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch (6.4-mm) letters for piping system abbreviation and 1/2-inch (13-mm) numbers, with numbering scheme approved by Engineer. Provide 5/32-inch (4-mm) hole for fastener.

1. Material: 0.032-inch- (0.8-mm-) thick brass.
2. Valve-Tag Fasteners: Brass wire-link or beaded chain; or S-hook.

2.4 VALVE SCHEDULES

A. Valve Schedules: For each piping system, on standard-size bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space),

normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-Schedule Frames: Glazed display frame for removable mounting on masonry walls for each page of valve schedule. Include mounting screws.
2. Frame: Extruded aluminum.
3. Glazing: Type I, Class 1, Glazing Quality B, 2.5-mm, single-thickness glass.

2.5 WARNING TAGS

A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags; of plasticized card stock with matte finish suitable for writing.

1. Size: Approximately 4 by 7 inches (100 by 178 mm).
2. Fasteners: Brass grommet and wire.
3. Nomenclature: Large-size primary caption such as DANGER, CAUTION, or DO NOT OPERATE.
4. Color: Yellow background with black lettering.

PART 3 - EXECUTION

3.1 APPLICATIONS, GENERAL

A. Products specified are for applications referenced in other Division 15 Sections. If more than single-type material, device, or label is specified for listed applications, selection is Installer's option.

3.2 EQUIPMENT IDENTIFICATION

A. Install and permanently fasten equipment nameplates on each major item of mechanical equipment that does not have a manufacturer’s nameplate or has a manufacturer’s nameplate that is damaged or located where not easily visible. Locate nameplates where accessible and visible. Include nameplates for the following general categories of equipment:

1. Fuel-burning units, including boilers.
2. Pumps, chillers and similar motor-driven units.
3. Fans, blowers, primary balancing dampers, and terminal units.
4. Packaged HVAC central-station units.

B. Install equipment markers with permanent adhesive on or near each major item of mechanical equipment. Data required for markers may be included on signs, and markers may be omitted if both are indicated.

1. Letter Size: Minimum 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

2. Data: Distinguish among multiple units, indicate operational requirements, indicate safety and emergency precautions, warn of hazards and improper operations, and identify units.
3. Locate markers where accessible and visible. Include markers for the following general categories of equipment:

    a. Main control and operating valves, including safety devices and hazardous units such as gas outlets.
    b. Fuel-burning units, including boilers.
    c. Pumps and similar motor-driven units.
    d. Fans, blowers, primary balancing dampers, and terminal units.
    e. Packaged HVAC central-station units.
    f. Tanks and pressure vessels.
    g. Strainers, water-treatment systems, and similar equipment.

C. Install equipment signs with screws or permanent adhesive on or near each major item of mechanical equipment. Locate signs where accessible and visible.

1. Identify mechanical equipment with equipment markers in the following color codes:

    a. Green: For cooling equipment and components.
    b. Yellow: For heating equipment and components.

2. Letter Size: Minimum 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
3. Data: Distinguish among multiple units, indicate operational requirements, indicate safety and emergency precautions, warn of hazards and improper operations, and identify units.

4. Include signs for the following general categories of equipment:

    a. Main control and operating valves, including safety devices and hazardous units such as gas outlets.
    b. Fuel-burning units, including boilers.
    c. Pumps and similar motor-driven units.
    d. Fans, blowers, primary balancing dampers, and terminal units.
    e. Packaged HVAC central-station units.
    f. Strainers, water-treatment systems, and similar equipment.

D. Install access panel markers with screws on equipment access panels.

3.3 PIPING IDENTIFICATION

A. Install manufactured pipe markers indicating service on each piping system. Install with flow indication arrows showing direction of flow.

1. Pipes with OD, Including Insulation, Less Than 10 Inches (150 mm): Pretensioned pipe markers. Use size to ensure a tight fit.

2. Pipes with OD, Including Insulation, 10 Inches (150 mm) and Larger: Shaped pipe markers. Use size to match pipe and secure with fasteners.

B. Locate pipe markers and color bands where piping is exposed in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior nonconcealed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and nonaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet (15 meters) along each run. Reduce intervals to 25 feet (7.6 meters) in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced markers.

C. Underground Piping Identification:

1. General: During backfilling/top-soiling of each exterior underground piping system, install continuous underground-type plastic line marker, located directly over buried line at 6 inches to 8 inches below finished grade. Where multiple small lines are buried in common trench and do not exceed overall width of 16", install single line marker.

3.4 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following:

1. Valve-Tag Size and Shape:

a. Cold Water: 1-1/2 inches (38 mm) round.
b. Hot Water: 1-1/2 inches (38 mm) round.
c. Gas: 1-1/2 inches (38 mm) round.

2. Valve-Tag Color:

a. Cold Water: Natural.
b. Hot Water: Natural.
c. Gas: Natural.

3. Letter Color:

a. Cold Water: Black.
b. Hot Water: Black.
c. Gas: Black.

3.5 VALVE-SCHEDULE INSTALLATION

A. Mount valve schedule on wall in accessible location in each major equipment room.

3.6 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

3.7 ADJUSTING

A. Relocate mechanical identification materials and devices that have become visually blocked by other work.

3.8 CLEANING

A. Clean faces of mechanical identification devices.

END OF SECTION 15075

SECTION 15081 - DUCT INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes semirigid and flexible duct, and plenum insulation; insulating cements; accessories and attachments; and sealing compounds.

B. Related Sections include the following:

1. Division 15 Section 15082, “Equipment Insulation,” for insulating equipment.
2. Division 15 Section 15083, "Pipe Insulation," for insulation for piping systems.

1.3 SUBMITTALS

A. Product Data: Identify thermal conductivity, thickness, and jackets (both factory and field applied, if any), for each type of product indicated.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing materials identical to those specified in this Section according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and sealer and cement material containers with appropriate markings of applicable testing and inspecting agency.

B. Insulation Installed Indoors: Flame-spread rating of 25 or less, and smoke-developed rating of 50 or less.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Ship insulation materials in containers marked by manufacturer with appropriate ASTM specification designation, type and grade, and maximum use temperature.

1.6 COORDINATION

A. Coordinate clearance requirements with duct Installer for insulation application.

1.7 SCHEDULING

A. Schedule insulation application after testing duct systems. Insulation application may begin on segments of ducts that have satisfactory test results.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Mineral-Fiber Insulation:

a. CertainTeed Manson.
b. Knauf FiberGlass GmbH.
c. Owens-Corning Fiberglas Corp.

2.2 INSULATION MATERIALS

A. Mineral-Fiber Board Thermal Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IB, without facing and with all-service jacket manufactured from kraft paper, reinforcing scrim, aluminum foil, and vinyl film.

B. Mineral-Fiber Blanket Thermal Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II, without facing and with all-service jacket manufactured from kraft paper, reinforcing scrim, aluminum foil, and vinyl film.

2.3 ACCESSORIES AND ATTACHMENTS

A. Weld-Attached Anchor Pins and Washers: Copper-coated steel pin for capacitor-discharge welding and galvanized speed washer. Pin length sufficient for insulation thickness indicated.

1. Welded Pin Holding Capacity: 100 lb (45 kg) for direct pull perpendicular to the attached surface.

B. Adhesive-Attached Anchor Pins and Speed Washers: Galvanized steel plate, pin, and washer manufactured for attachment to duct and plenum with adhesive. Pin length sufficient for insulation thickness indicated.

1. Adhesive: Recommended by the anchor pin manufacturer as appropriate for surface temperatures of ducts, plenums, and breechings; and to achieve a holding capacity of 100 lb (45 kg) for direct pull perpendicular to the adhered surface.

C. Self-Adhesive Anchor Pins and Speed Washers: Galvanized steel plate, pin, and washer manufactured for attachment to duct and plenum with adhesive. Pin length sufficient for insulation thickness indicated.

2.4 VAPOR RETARDERS

A. Mastics: Materials recommended by insulation material manufacturer that are compatible with insulation materials, jackets, and substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.3 GENERAL APPLICATION REQUIREMENTS

A. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; and free of voids throughout the length of ducts and fittings.

B. Refer to schedules at the end of this Section for materials, forms, jackets, and thicknesses required for each duct system.

C. Use accessories compatible with insulation materials and suitable for the service. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Seal joints and seams with vapor-retarder mastic on insulation indicated to receive a vapor retarder.

E. Keep insulation materials dry during application and finishing.

F. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer.

G. Apply insulation with the least number of joints practical.

H. Apply insulation over fittings and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated.

I. Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic. Apply insulation continuously through hangers and around anchor attachments.

J. Insulation Terminations: For insulation application where vapor retarders are indicated, seal ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.

K. Apply insulation with integral jackets as follows:

1. Pull jacket tight and smooth.
2. Joints and Seams: Cover with tape and vapor retarder as recommended by insulation material manufacturer to maintain vapor seal.
3. Vapor-Retarder Mastics: Where vapor retarders are indicated, apply mastic on seams and joints and at ends adjacent to duct flanges and fittings.

L. Cut insulation according to manufacturer's written instructions to prevent compressing insulation to less than 75 percent of its nominal thickness.

M. Install vapor-retarder mastic on ducts and plenums scheduled to receive vapor retarders.

1. Ducts with Vapor Retarders: Overlap insulation facing at seams and seal with vapor-retarder mastic and pressure-sensitive tape having same facing as insulation. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-retarder seal.
2. Ducts without Vapor Retarders: Overlap insulation facing at seams and secure with outward clinching staples and pressure-sensitive tape having same facing as insulation.

N. Interior Wall and Partition Penetrations: Apply insulation continuously through walls and partitions.

3.4 MINERAL-FIBER INSULATION APPLICATION

A. Blanket Applications for Ducts and Plenums: Secure blanket insulation with anchor pins and speed washers.

1. Install anchor pins and speed washers on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

   a. On the underside of ducts over 24 inches wide spaced 3 inches maximum from the butt joint.
   b. Do not over-compress insulation during installation.

2. Impale insulation over anchors and attach speed washers.
3. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
4. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches (50 mm) from one edge and one end of insulation segment. Secure laps to adjacent insulation segment with 1/2 inch (13 mm) staples, 1 inch (25 mm) o.c., and cover with pressure-sensitive tape having same facing as insulation.
5. Overlap unfaced blankets a minimum of 2 inches (50 mm) on longitudinal seams and end joints. Secure with steel band at end joints and spaced a maximum of 18 inches (450 mm) o.c.

6. Apply insulation on rectangular duct elbows and transitions with a full insulation segment for each surface. Apply insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
7. Insulate duct stiffeners, hangers, and flanges that protrude beyond the insulation surface with 6 inch (150 mm) wide strips of the same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with anchor pins spaced 6 inches (150 mm) o.c.
8. Apply vapor-retarder mastic to open joints, breaks, and punctures for insulation indicated to receive vapor retarder.

B. Board Applications for Ducts and Plenums: Secure board insulation with adhesive and anchor pins and speed washers.

1. Apply adhesive according to manufacturer's recommended coverage rates per square foot, spotted to assist installation.
2. Space anchor pins as required to secure insulation starting 3 inches maximum from the butt joints.
3. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
4. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches (50 mm) from one edge and one end of insulation segment. Secure laps to adjacent insulation segment with 1/2 inch (13 mm) staples, 1 inch (25 mm) o.c., and cover with pressure-sensitive tape having same facing as insulation.
5. Apply insulation on rectangular duct elbows and transitions with a full insulation segment for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Apply insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
6. Insulate duct stiffeners, hangers, and flanges that protrude beyond the insulation surface with 6 inch (150 mm) wide strips of the same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with anchor pins spaced 6 inches (150 mm) o.c.
7. Apply vapor-retarder mastic to open joints, breaks, and punctures for insulation indicated to receive vapor retarder.

3.5 DUCT SYSTEM APPLICATIONS

A. Insulation materials and thicknesses are specified in schedules at the end of this Section.

B. Materials and thicknesses for systems listed below are specified in Schedules at the end of this Section.

C. Insulate the following plenums and duct systems:

1. Indoor concealed supply-, return-, and outside-air ductwork.
2. Indoor exposed supply-, return-, and outside-air ductwork.

3.6 INDOOR DUCT AND PLENUM APPLICATION SCHEDULE

A. Service: Supply-air, return-air, and outside-air ducts, concealed.

1. Material: Mineral-fiber blanket.
2. Thickness: 2 inches (50 mm).
3. Number of Layers: One.
4. Vapor Retarder Required: Yes.

B. Service: Supply-air, return-air, and outside-air ducts, exposed.

1. Material: Mineral-fiber board.
2. Thickness: 1 1/2 inch (25 mm).
3. Number of Layers: One.
4. Vapor Retarder Required: Yes.
5. Field Applied Jacket: Yes

a. VentureClad 1577CW-WM

1) Multi-ply Laminate: Interior and exterior use.
2) White: 1577CW-WM.

3.7 OUTDOOR DUCT AND PLENUM APPLICATION SCHEDULE

A. Service: Supply-, outside-, and return-air ducts, exterior.
1. Material: Mineral-fiber board.
2. Thickness: 2 inch.
3. Number of Layers: Two.
4. Field-Applied Jacket: VentureClad 1577CW-WM
5. Vapor Retarder Required: Yes.

END OF SECTION 15081

SECTION 15083 - PIPE INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes preformed, rigid and flexible pipe insulation; insulating cements; field-applied jackets; accessories and attachments; and sealing compounds.

B. Related Sections include Division 15 Section 15060, "Hangers and Supports," for pipe insulation shields and protection saddles.

1.3 SUBMITTALS

A. Product Data: Identify thermal conductivity, thickness, and jackets (both factory and field applied, if any), for each type of product indicated.

B. Installer Certificates: Signed by the Contractor certifying that installers comply with requirements.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An insulation firm with successful installation experience on projects with mechanical systems insulations similar to that required for this project.

B. Fire-Test-Response Characteristics: As determined by testing materials identical to those specified in this Section according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and sealer and cement material containers with appropriate markings of applicable testing and inspecting agency.

1. Insulation Installed Indoors: Flame-spread rating of 25 or less, and smoke-developed rating of 50 or less.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Ship insulation materials in containers marked by manufacturer with appropriate ASTM specification designation, type and grade, and maximum use temperature.

1.6 COORDINATION

A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 15 Section 15060, "Hangers and Supports."

B. Coordinate clearance requirements with piping Installer for insulation application.

C. Coordinate installation and testing of heat tracing.

1.7 SCHEDULING

A. Schedule insulation application after testing piping systems and, where required, after installing and testing heat-trace tape. Insulation application may begin on segments of piping that have satisfactory test results.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Firms regularly engaged in the manufacture of piping insulation products, of types and sizes required, whose products have been in satisfactory use in similar service.

2.2 INSULATION MATERIALS

A. Mineral-Fiber Insulation: Glass fibers bonded with a thermosetting resin complying with the following:

1. Preformed Pipe Insulation: Minimum 4 pound density, 0.23 maximum k factor at 75 degrees F mean temperature, with factory-applied, all-purpose, vapor-retarder jacket.
2. Blanket Insulation: Minimum 3/4 pound density 0.3 maximum k factor at 75 degrees F mean temperature, without facing.
3. Insulation Accessories: Provide staples, bands, wires, cement, tape, anchors, corner angles, and similar accessories as recommended by the insulation manufacturer for the applications indicated.
4. Insulation Compounds: Provide cements, adhesives, coatings, sealers, protective finishes, and similar compounds as recommended by the insulation manufacturer for the applications indicated.
5. Lagging Adhesive: Foster Sealfas Coating 30-36, Insul. Coustic I-C 102, St. Clair Rubber Co. Z41A, or approved equal.

B. Flexible Elastomeric Thermal Insulation: Closed-cell, sponge- or expanded-rubber materials, with smooth skin on both sides. Thermal conductivity 0.30 average maximum at 75 degrees F.

1. Adhesive: As recommended by insulation material manufacturer.

2.3 FIELD-APPLIED JACKETS

A. PVC Jacket: High-impact, ultraviolet-resistant PVC; 20 mils (0.5 mm) thick; roll stock ready for shop or field cutting and forming.

1. Adhesive: As recommended by insulation material manufacturer.
2. PVC Jacket Color: White.

B. Standard PVC Fitting Covers: Factory-fabricated fitting covers manufactured from 20 mil (0.5 mm) thick, high-impact, ultraviolet-resistant PVC.

1. Shapes: 45 and 90 degree, short and long radius elbows, tees, valves, flanges, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories for the disabled.
2. Adhesive: As recommended by insulation material manufacturer.

2.4 ACCESSORIES AND ATTACHMENTS

A. Glass Cloth and Tape: Woven glass-fiber fabrics, plain weave, pre-sized a minimum of 8 oz./sq. yd. (270 g/sq. m).

1. Tape Width: 4 inches (100 mm).

B. Bands: 3/4 inch (19 mm) wide, in one of the following materials compatible with jacket:

1. Stainless Steel: Type 304; 0.020 inch (0.5 mm) thick.

C. Wire: 062-inch (1.6-mm), soft-annealed, stainless steel.

2.5 VAPOR RETARDERS

A. Mastics: Materials recommended by insulation material manufacturer that are compatible with insulation materials, jackets, and substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry pipe and fitting surfaces. Remove materials that will adversely affect insulation application.

3.3 GENERAL APPLICATION REQUIREMENTS

A. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; free of voids throughout the length of piping, including fittings, valves, and specialties.

B. Refer to schedules at the end of this Section for materials, forms, jackets, and thicknesses required for each piping system.

C. Use accessories compatible with insulation materials and suitable for the service. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Apply insulation with longitudinal seams at top and bottom of horizontal pipe runs.

E. Apply multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Seal joints and seams with vapor-retarder mastic on insulation indicated to receive a vapor retarder.

H. Keep insulation materials dry during application and finishing.

I. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer.

J. Apply insulation with the least number of joints practical.

K. Apply insulation over fittings, valves, and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated. Refer to special instructions for applying insulation over fittings, valves, and specialties.

L. Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, and other projections with vapor-retarder mastic.

1. Apply insulation continuously through hangers and sleeves. All hangers and supports shall be external of insulation.
2. Install insert materials and apply insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by the insulation material manufacturer.
3. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect the jacket from tear or puncture by the hanger, support, and shield.

M. Insulation Terminations: For insulation application where vapor retarders are indicated, taper insulation ends. Seal tapered ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.

N. Apply adhesives and mastics at the manufacturer's recommended coverage rate.

O. Apply insulation with integral jackets as follows:

1. Pull jacket tight and smooth.
2. Circumferential Joints: Cover with 3 inch (75 mm) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip and spaced 4 inches (100 mm) o.c.
3. Longitudinal Seams: Overlap jacket seams at least 1-1/2 inches (40 mm). Apply insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches (100 mm) o.c.

    a. Exception: Do not staple longitudinal laps on insulation having a vapor retarder.

4. Vapor-Retarder Mastics: Where vapor retarders are indicated, apply mastic on seams and joints and at ends adjacent to flanges, unions, valves, and fittings.
5. At penetrations in jackets for thermometers and pressure gages, fill and seal voids with vapor-retarder mastic.

P. Comply with MICA Insulation Standards. Insulate valves per Plate No. 14.

Q. Provide removable insulated covers for all balancing valves, temperature/pressure plugs, and any other items that require access. No openings in the insulation or vapor barrier will be permitted on cold lines.

3.4 MINERAL-FIBER INSULATION APPLICATION

A. Apply insulation to straight pipes and tubes as follows:

1. Where pipe expansion is anticipated, detail expansion compensation for insulation on Drawings and indicate intervals for its occurrence. See MICA's "National Commercial & Industrial Insulation Standards," Plate No. 41A.
2. Secure each layer of preformed pipe insulation to pipe with wire, tape, or bands without deforming insulation materials.
3. Where vapor retarders are indicated, seal longitudinal seams and end joints with vapor-retarder mastic. Apply vapor retarder to ends of insulation at intervals of 15 to 20 feet (4.5 to 6 meters) to form a vapor retarder between pipe insulation segments.
4. For insulation with factory-applied jackets with vapor retarders, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by the insulation material manufacturer and seal with vapor-retarder mastic.

B. Apply insulation to flanges as follows:

1. Apply preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation segment the same as overall width of the flange and bolts, plus twice the thickness of the pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.

4. Apply canvas jacket material with manufacturer's recommended adhesive, overlapping seams at least 1 inch (25 mm), and seal joints with vapor-retarder mastic.

C. Apply insulation to fittings and elbows as follows:

1. Apply pre-molded insulation sections of the same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When pre-molded insulation elbows and fittings are not available, apply mitered sections of pipe insulation to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire, tape, or bands.
3. Cover fittings with standard PVC fitting covers. Secure fitting covers with manufacturer's attachments and accessories. Seal seams with tape and vapor-retarder mastic.

D. Apply insulation to valves and specialties as follows:

1. Apply pre-molded insulation sections of the same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When pre-molded insulation sections are not available, apply glass-fiber blanket insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation. For check valves, arrange insulation for access to strainer basket without disturbing insulation.
3. Apply insulation to flanges as specified for flange insulation application.
4. Use preformed standard PVC fitting covers for valve sizes where available. Secure fitting covers with manufacturer's attachments and accessories. Seal seams with tape and vapor-retarder mastic.

3.5 FLEXIBLE ELASTOMERIC THERMAL INSULATION APPLICATION

A. Apply insulation to straight pipes and tubes as follows:

1. Follow manufacturer's written instructions for applying insulation.
2. Seal longitudinal seams and end joints with manufacturer's recommended adhesive. Cement to avoid openings in insulation that will allow passage of air to the pipe surface.

B. Apply insulation to fittings and elbows as follows:

1. Apply mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive. Cement to avoid openings in insulation that will allow passage of air to the pipe surface.

3.6 PIPING SYSTEM APPLICATIONS

A. Insulation materials and thicknesses are specified in schedules at the end of this Section.

3.7 FIELD QUALITY CONTROL

A. Inspection: Perform the following field quality-control inspections, after installing insulation materials, jackets, and finishes, to determine compliance with requirements:

1. Inspect fittings and valves randomly selected by Architect.
2. Remove fitting covers from 5 elbows or 1 percent of elbows, whichever is less, for various pipe sizes.
3. Remove fitting covers from 5 valves or 1 percent of valves, whichever is less, for various pipe sizes.

B. Insulation applications will be considered defective if sample inspection reveals noncompliance with requirements. Remove defective work and replace with new materials according to these Specifications.

C. Reinstall insulation and covers on fittings and valves uncovered for inspection according to these Specifications.

3.8 INSULATION APPLICATION SCHEDULE, GENERAL

A. Refer to insulation application schedules for required insulation materials, vapor retarders, and field-applied jackets.

3.9 INSULATION APPLICATION SCHEDULE

A. Service: Domestic cold water.

1. Operating Temperature: 60 to 140 degrees F (15 to 60 degrees C).
2. Insulation Material: Mineral fiber.
3. Insulation Thickness: Apply the following insulation thicknesses:

    a. Cold: 1/2 inch.

4. Field-Applied Jacket: PVC for exposed piping.
5. Vapor Retarder Required: Yes.
6. Finish: None.

B. Service: Condensate drain piping.

1. Operating Temperature: 35 to 75 degrees F (2 to 24 degrees C).
2. Insulation Material: Flexible elastomeric.
3. Insulation Thickness: 3/4 inch.
4. Field-Applied Jacket: None.
5. Vapor Retarder Required: Yes.
6. Finish: Painted.

C. Service: Exterior Condenser.

1. Operating Temperature: 40 to 90 degrees.
2. Insulation Material: Mineral fiber.
3. Insulation Thickness: Apply the following insulation thicknesses:

    a. Steel Pipe; all sizes: 1-1/2 inch.

4. Field-Applied Jacket: PVC for exposed piping.
5. Vapor Retarder Required: No.
6. Finish: None.

D. Service: Indoor refrigerant suction and vapor piping.

1. Operating Temperature: 35 to 50 degrees F (2 to 10 degrees C).
2. Insulation Material: Flexible elastomeric.
3. Insulation Thickness: 3/4".
4. Finish: None.

E. Service: Outdoor refrigerant suction.

1. Operating Temperature: 35 to 50 degrees F (2 to 10 degrees C).
2. Insulation Material: Flexible elastomeric.
3. Insulation Thickness: 3/4".
4. Finish: Painted with two coats of ultraviolet-protective coating.

END OF SECTION 15083

SECTION 15110 - VALVES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes general duty valves common to several mechanical piping systems.

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each valve type. Include body material, valve design, pressure and temperature classification, end connection details, seating materials, trim material and arrangement, dimensions and required clearances, and installation instructions. Include list indicating valve and its application.

C. Maintenance data for valves to include in the operation and maintenance manual specified in Division 1. Include detailed Manufacturer's instructions on adjusting, servicing, disassembling, and repairing.

1.4 QUALITY ASSURANCE

A. ASME Compliance: Comply with ASME B31.9 for building services piping.

B. MSS Compliance: Comply with the various MSS Standard Practice documents referenced.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooves, and weld ends.
3. Set globe and gate valves closed to prevent rattling.
4. Block check valves in either closed or open position.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store indoors and maintain valve temperature higher than ambient dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equivalent:

1. Ball Valves: 2 Inches and Smaller:

a. Milwaukee, BA110
b. Stockham, S216

2. Gate Valves, Class 125: 2-1/2 Inches and Larger

a. Crane, 461
b. Jenkins, 326
c. Hammond, IR 1138
d. Walworth, 719-F

3. Butterfly Valves:

		2 Inches and Smaller	2-1/2 Inches and Larger
a.	Crane	37	373
b.	Hammond	IB 940	IR 1124
c.	Nibco	LD 300 Series	LD 300 Series

2.2 BASIC, COMMON FEATURES

A. Design: Rising stem or rising outside screw and yoke stems, except as specified below.

1. Nonrising stem valves may be used only where headroom prevents full extension of rising stems.

B. Pressure and Temperature Ratings: As indicated in the "Application Schedule" of Part 3 of this Section and as required to suit system pressures and temperatures.

C. Sizes: Same size as upstream pipe, unless otherwise indicated.

D. Operators: Use specified operators and handwheels, except provide the following special operator features:

1. Handwheels: For valves other than quarter turn.

E. Extended Stems: Where insulation is indicated or specified, provide extended stems arranged to receive insulation.

F. Threads: ASME B1.20.1.

G. Flanges: ASME B16.1 for cast iron, ASME B16.5 for steel, and ASME B16.24 for bronze valves.

H. Solder Joint: ASME B16.18.

1. Caution: Where soldered end connections are used, use solder having a melting point below 840 degrees F (450 degrees C) for gate, globe, and check valves; below 421 degrees F (216 degrees C) for ball valves.

2.3 GATE VALVES

A. Gate Valves, Class 125, 2-1/2 Inches (DN65) and Larger: MSS SP-70, Class 125, 200 psi (1380 kPa) CWP, ASTM A 126 cast-iron body and bonnet, solid cast-iron wedge, brass-alloy stem, outside screw and yoke, teflon-impregnated packing with 2 piece packing gland assembly, flanged end connections; and with cast-iron handwheel.

B. Gate Valves, Class 200, 2 Inches (DN50) and Smaller: MSS SP-80; Class 200, 400 psi (2760 kPa) cold working pressure (CWP); ASTM B 62 cast-bronze body and bonnet, solid-bronze wedge, copper-silicon alloy rising stem, Teflon-impregnated packing with bronze packing nut, threaded or soldered end connections; and with aluminum or malleable-iron handwheel.

C. Gate Valves, Class 250, 2-1/2 Inches (DN 65) and Larger: MSS SP-70, Class 250, 500 psi (3450 kPa) CWP, ASTM a 126 cast-iron body and bonnet, solid cast-iron wedge, brass-alloy stem, outside screw and yoke, Teflon-impregnated packing with 2 piece packing gland assembly, flanged end connections; and with cast-iron handwheel.

2.4 CHECK VALVES

A. Swing Check Valves, Class 125, 2 Inches (DN50) and Smaller: MSS SP-80; Class 125, 200 psi (1380 kPa) CWP, or Class 150, 300 psi (2070 kPa) CWP; horizontal swing, Y-pattern, ASTM B 62 cast-bronze body and cap, rotating bronze disc composition seat, threaded or soldered end connections.

B. Swing Check Valves, Class 125, 2-1/2 Inches (DN65) and Larger: MSS SP-71, Class 125, 200 psi (1380 kPa) CWP, ASTM A 126 cast-iron body and bolted cap, horizontal-swing bronze disc, flanged connections.

C. Swing Check Valves, Class 200, 2-1/2 Inches (DN65) and Smaller: MSS SP-80; Class 200, 400 psi (2760 kPa) CWP; horizontal swing, Y-pattern, ASTM B 62 cast-bronze body and cap, rotating bronze disc with composition seat, threaded end connections.

2.5 BALL VALVES

A. Ball Valves - 2 Inches (DN50) and Smaller: MSS SP-110, Class 150, 600 psi (4140 kPa) CWP, ASTM B 584 bronze body and bonnet, 2-piece construction; chrome-plated brass ball, standard port for 1/2 inch (DN15) valves and smaller and conventional port for 3/4 inch (DN20) valves and larger; blowout proof; bronze or brass stem; teflon seats and seals; threaded end connections.

B. Operator: Vinyl-covered steel lever handle.

C. Stem Extension: For valves installed in insulated piping.

D. Memory Stop: For operator handles.

2.6 BUTTERFLY VALVES

A. Butterfly Valves: MSS SP-67, 200 psi (1380 kPa) CWP, 150 psi (1035 kPa) maximum pressure differential, ASTM A 126 cast-iron body and bonnet, extended neck, stainless-steal stem, field-replaceable EPDM or Buna N sleeve and stem seals, lug style, gear operator, wheel handle.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine piping system for compliance with requirements for installation tolerances and other conditions affecting performance of valves. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

C. Operate valves from fully open to fully closed positions. Examine guides and seats made accessible by such operation.

D. Examine threads on valve and mating pipe for form and cleanliness.

E. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Check gasket material for proper size, material composition suitable for service, and freedom from defects and damage.

F. Do not attempt to repair defective valves; replace with new valves.

3.2 INSTALLATION

A. Install valves as indicated, according to Manufacturer's written instructions.

B. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate the general arrangement of piping, fittings, and specialties.

C. Install valves with unions or flanges at each piece of equipment arranged to allow servicing, maintenance, and equipment removal without system shutdown.

D. Locate valves for easy access and provide separate support where necessary.

E. Install valves in horizontal piping with stem at or above the center of the pipe.

F. Install valves in a position to allow full stem movement.

3.3 SOLDERED CONNECTIONS

A. Cut tube square and to exact lengths.

B. Clean end of tube to depth of valve socket with steel wool, sand cloth, or a steel wire brush to a bright finish. Clean valve socket.

C. Apply proper soldering flux in an even coat to inside of valve socket and outside of tube.

D. Open gate and globe valves to fully open position.

E. Remove the cap and disc holder of swing check valves having composition discs.

F. Insert tube into valve socket, making sure the end rests against the shoulder inside valve. Rotate tube or valve slightly to ensure even distribution of the flux.

G. Apply heat evenly to outside of valve around joint until solder melts on contact. Feed solder until it completely fills the joint around tube. Avoid hot spots or overheating valve. Once the solder starts cooling, remove excess amounts around the joint with a cloth or brush.

3.4 THREADED CONNECTIONS

A. Note the internal length of threads in valve ends and proximity of valve internal seat or wall to determine how far pipe should be threaded into valve.

B. Align threads at point of assembly.

C. Apply appropriate tape or thread compound to the external pipe threads, except where dry seal threading is specified.

D. Assemble joint, wrench tight. Wrench on valve shall be on the valve end into which the pipe is being threaded.

3.5 FLANGED CONNECTIONS

A. Align flange surfaces parallel.

B. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly with a torque wrench.

3.6 VALVE END SELECTION

A. Select valves with the following ends or types of pipe/tube connections:

1. Copper Tube Size, 2 Inches (DN50) and Smaller: Solder ends.
2. Steel Pipe Sizes, 2 Inches (DN50) and Smaller: Threaded.
3. Steel and Copper Pipe Sizes, 2-1/2 Inches (DN65) and Larger: Flanged.

3.7 APPLICATION SCHEDULE

A. General Application: Use gate, ball, and butterfly valves for shutoff duty; globe, ball, and butterfly for throttling duty. Refer to Piping System Specification Sections for specific valve applications and arrangements.

B. Domestic Water Systems: Ball Valves: For 2 inches and smaller, Class 150.

C. Condenser Water Systems: Use the following valve types:

1. Ball Valves: For 2 inches and smaller, Class 150.
2. Gate Valves: Class 150, bronze or cast-iron body to suit piping system, for 2-1/2 inches and larger.

3.8 ADJUSTING

A. Adjust or replace packing after piping systems have been tested and put into service, but before final adjusting and balancing. Replace valves if leak persists.

END OF SECTION 15110

SECTION 15122 - GAGES AND THERMOMETERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes gages and thermometers for mechanical systems.

1.3 SUBMITTALS

A. Product Data: Include scale range, ratings, and calibrated performance curves for each gage, fitting, specialty, and accessory specified.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equivalent:

1. Bimetal Dial Thermometers:

a. Marsh Bellofram, L Series.
b. Miljoco, MX Series.
c. Trerice: H. O. Trerice Co., B Series.
d. Weiss Instruments, Inc., 5BVM Series.
e. Weksler Instruments, AF Series.

2. Pressure Gages:

a. Marsh Bellofram, H Series.
b. Miljoco, P45 Series.
c. Trerice: H. O. Trerice Co., 890 Series.
d. Weiss Instruments, Inc., 4CTS Series.
e. Weksler Instruments, EA Series.

3. Test Plugs:

a. Flow Design, Inc., “Super Seal”.
b. Peterson Equipment Co., Inc., #110.
c. Sisco Manufacturing Co., #BNE-025.

2.2 THERMOMETERS, GENERAL

A. Scale Range: Temperature ranges for services listed are as follows:

1. Hot Water: 30 to 300 degrees F, with 2 degree scale divisions (minus 0 to plus 150 degrees C, with 1 degree scale divisions).
2. Chilled Water: 0 to 100 degrees F, with 2 degree scale divisions (minus 18 to plus 38 degrees C, with 1 degree scale divisions).

B. Accuracy: Plus or minus 1 percent of range span or plus or minus one scale division to maximum of 1.5 percent of range span.

2.3 BI-METAL DIAL THERMOMETERS

A. Description: ASME B40.3; direct-mounting, universal-angle dial type.

B. Case: Stainless steel with 5 inch (125 mm) diameter, glass lens.

C. Adjustable Joint: Finish to match case, 180 degree adjustment in vertical plane, 360 degree adjustment in horizontal plane, with locking device.

D. Element: Bimetal coil.

E. Scale: Satin-faced non-reflective aluminum with permanently etched markings.

F. Stem: Stainless steel for separable socket, of length to suit installation.

2.4 SEPARABLE SOCKETS

A. Description: Fitting with protective socket for installation in threaded pipe fitting to hold fixed thermometer stem.

1. Material: Stainless steel, for use in steel piping.
2. Extension-Neck Length: Nominal thickness of 2 inches (50 mm), but not less than thickness of insulation. Omit extension neck for sockets for piping not insulated.
3. Insertion Length: To extend 2 inches (50 mm) into pipe.
4. Heat-Transfer Fluid: Oil or graphite.

2.5 THERMOMETER WELLS

A. Description: Fitting with protective well for installation in threaded pipe fitting to hold test thermometer.

1. Material: Stainless steel, for use in steel piping.
2. Extension-Neck Length: Nominal thickness of 2 inches (50 mm), but not less than thickness of insulation. Omit extension neck for wells for piping not insulated.
3. Insertion Length: To extend 2 inches (50 mm) into pipe.
4. Cap: Threaded, with chain permanently fastened to socket.
5. Heat-Transfer Fluid: Oil or graphite.

2.6 PRESSURE GAGES

A. Description: Phosphor-bronze bourdon-tube type with bottom connection; dry type, unless liquid-filled-case type is indicated.

B. Case: Drawn steel, brass, or aluminum with 4-1/2 inch (115 mm) diameter, glass lens.

C. Connector: Brass, NPS 1/4 (DN8).

D. Scale: White-coated aluminum with permanently etched markings.

E. Accuracy: Grade A, plus or minus 1 percent of middle 50 percent of scale.

F. Range: Comply with the following:

1. Fluids under Pressure: Two times the operating pressure.

2.7 PRESSURE-GAGE FITTINGS

A. Valves: NPS 1/4 (DN8) brass or stainless-steel needle type.

B. Snubbers: NPS 1/4 (DN8) brass bushing with corrosion-resistant porous-metal disc of material suitable for system fluid and working pressure.

2.8 TEST PLUGS

A. Description: Nickel-plated, brass-body test plug in NPS 1/2 (DN15) fitting.

B. Body: Length as required to extend beyond insulation.

C. Pressure Rating: 500 psig (3450 kPa) minimum.

D. Core Inserts: Two self-sealing valves, suitable for inserting 1/8 inch (3 mm) OD probe from dial-type thermometer or pressure gage.

E. Core Material for Air and Water: Minus 30 to plus 275 degrees F (Minus 35 to plus 136 degrees C), ethylene-propylene-diene terpolymer rubber.

F. Test-Plug Cap: Gasketed and threaded cap, with retention chain or strap.

G. Test Kit: Pressure gage and adapter with probe, two bimetal dial thermometers, and carrying case.

1. Pressure Gage and Thermometer Ranges: Approximately two times the system's operating conditions.

PART 3 - EXECUTION

3.1 METER AND GAGE INSTALLATION, GENERAL

A. Install gages and accessories according to manufacturer's written instructions for applications where used.

3.2 THERMOMETER INSTALLATION

A. Install thermometers and adjust vertical and tilted positions.

B. Install separable sockets in vertical position in piping tees where fixed thermometers are indicated.

1. Install with socket extending a minimum of 2 inches (50 mm) into fluid.
2. Fill sockets with oil or graphite and secure caps.

C. Install thermometer wells in vertical position in piping tees where test thermometers are indicated.

1. Install with stem extending a minimum of 2 inches (50 mm) into fluid.
2. Fill wells with oil or graphite and secure caps.

3.3 PRESSURE-GAGE INSTALLATION

A. Install pressure gages in piping tees with pressure-gage valve located on pipe at most readable position.

B. Install pressure-gage needle valve and snubber in piping to water pressure gages.

3.4 TEST PLUG INSTALLATION

A. Install test plugs in piping tees where indicated, located on pipe at most readable position. Secure cap.

3.5 CONNECTIONS

A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping and specialties. The following are specific connection requirements:

1. Install gages adjacent to machines and equipment to allow service and maintenance.

3.6 ADJUSTING AND CLEANING

A. Adjust faces of gages to proper angle for best visibility.

B. Clean windows of gages and clean factory-finished surfaces. Replace cracked and broken windows, and repair scratched and marred surfaces with manufacturer's touchup paint.

END OF SECTION 15122

SECTION 15140 - DOMESTIC WATER PIPING SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

1.2 DESCRIPTION OF WORK

A. Extent of domestic water piping systems work is indicated on Drawings and Schedules and by requirements of this Section.

B. Applications for domestic water piping systems include the following:

1. Domestic cold-water piping.

C. Refer to appropriate Division 15 Sections for insulation required in connection with domestic water piping; not work of this Section.

D. Trenching and backfill required in conjunction with exterior water piping is specified in applicable Division 2 Sections, and is included as work of this Section.

1.3 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in manufacture of domestic water piping systems products, of types, materials, and sizes required, whose products have been in satisfactory use in similar service.

B. Plumbing Code Compliance: Comply with applicable portions of governing Plumbing Code pertaining to plumbing materials, construction, and installation of products.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's data for domestic water piping systems, materials, and products.

PART 2 - PRODUCTS

2.1 DOMESTIC WATER PIPING MATERIALS AND PRODUCTS

A. General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated and scheduled. Where not indicated or scheduled, provide proper selection as determined by Installer to comply with

installation requirements. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in domestic water piping systems. Where more than one type of material or product is indicated, selection is Installer's option.

2.2 BASIC IDENTIFICATION

A. General: Provide identification complying with Division 15 Section 15075, "Mechanical Identification," in accordance with the following listing:

1. Water Service: Underground-type plastic line markers.

2.3 BASIC PIPE, TUBE, AND FITTINGS

A. General: Provide pipe, tube, and fittings complying with Division 15 Section 15050, "Basic Mechanical Materials and Methods," in accordance with the Schedule on the Drawings.

2.4 BASIC HANGERS AND SUPPORTS

A. General: Provide hangers and supports complying with Division 15 Section 15060, "Hangers and Supports."

2.5 BASIC VALVES

A. General: Provide valves complying with Division Section 15110, "Valves".

PART 3 - EXECUTION

3.1 INSTALLATION OF DOMESTIC WATER PIPING

A. General: Install water distribution piping in accordance with Division 15 Section 15050, "Basic Mechanical Materials and Methods."

3.2 INSTALLATION OF PIPING SPECIALTIES

A. Install wood blocking reinforcement for wall mounting and recessed type plumbing specialties.

3.3 INSTALLATION OF HANGERS AND SUPPORTS

A. Install hangers and supports in accordance with Division 15 Section 15060, "Hangers and Supports."

3.4 FIELD QUALITY CONTROL

A. Test water and hot water piping throughout hydrostatically at 150 p.s.i.g. (four hours).

B. Repair or replace domestic water piping as required to eliminate leaks and retest as specified to demonstrate compliance.

C. Sterilization: Sterilize all water lines in strict accordance with State Board of Health requirements. After flushing out, obtain approval of water sample analysis from State Board of Health and submit to Architect.

3.5 SPARE PARTS

A. Furnish to Owner, with receipt, one valve key for each key-operated hydrant, bibb, or faucet installed."

END OF SECTION 15140

SECTION 15150 - SOIL, WASTE, AND VENT PIPING SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

1.2 DESCRIPTION OF WORK

A. Extent of soil, waste, and vent piping system work is indicated on Drawings and Schedules, and by requirements of this Section.

B. Trenching and backfilling required in conjunction with underground drain piping is specified in applicable Division 2 Sections and is included as work of this Section.

1.3 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in manufacture of piping products of types, materials, and sizes required, whose products have been in satisfactory use in similar service.

B. Plumbing Code Compliance: Comply with applicable portions of governing Plumbing Code pertaining to plumbing materials, construction, and installation of products.

C. ANSI Compliance: Comply with applicable American National Standards pertaining to products and installation of soil, waste, and vent piping systems.

D. PDI Compliance: Comply with applicable Plumbing and Drainage Institute Standards pertaining to products and installation of soil, waste, and vent piping systems.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's data for soil, waste, and vent piping systems materials and products.

PART 2 - PRODUCTS

2.1 SOIL, WASTE AND VENT PIPING MATERIALS AND PRODUCTS

A. General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide

sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in soil, waste, and vent piping systems. Where more than one type of materials or product is indicated, selection is Installer's option.

2.2 BASIC PIPE, TUBE AND FITTINGS

A. General: Provide pipe, tube, and fittings complying with Division 15 Section 15050, "Basic Mechanical Materials and Methods," in accordance with the Schedule on the Drawings.

2.3 BASIC HANGERS AND SUPPORTS

A. General: Provide hangers and supports complying with Division 15 Section 15060, "Hangers and Supports."

2.4 DRAINAGE PIPING PRODUCTS

A. General: Provide factory-fabricated drainage piping products of size and type indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements and governing regulations.

PART 3 - EXECUTION

3.1 INSTALLATION OF SOIL, WASTE AND VENT ABOVE GROUND PIPING

A. General: Install soil, waste, and vent piping in accordance with Division 15 Section 15050, "Basic Mechanical Materials and Methods," and with governing Plumbing Code.

B. Flashing: Flash all vent penetrations through roofs as approved by roof manufacturer. Offset vents where necessary to provide 2 feet minimum clearance from other flashing such as outside walls, curbs, etc. All flashing shall be as approved by roofing manufacturer.

3.2 INSTALLATION OF BUILDING DRAIN PIPING

A. General: Install underground building drains as indicated and in accordance with governing Plumbing Code. Lay underground building drains beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install required gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and other special installation requirements. Clean interior of piping of dirt and other superfluous material as work progresses. Maintain swab or drag-in-line and pull past each joint as it is

completed. Place plugs in ends of uncompleted piping at end of day or whenever work stops.

B. Install soil, waste and vent piping pitched to drain at minimum slope of 1/4 inch per foot (2 percent) for piping 3 inches and smaller, and 1/8 inch per foot (1 percent) for piping 4 inches and larger.

3.3 INSTALLATION OF HANGERS AND SUPPORTS

A. Install hangers and supports in accordance with Division 15 Section 15060, "Hangers and Supports."

3.4 PIPING TESTS

A. Test soil, waste, and vent piping system in accordance with requirements of governing Plumbing Code, but not less than 10 foot head water test.

END OF SECTION 15150

SECTION 15170 - CONDENSATE DRAIN PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes piping for drain lines and condensate drain piping.

B. Related Sections include the following:

1. Division 15 Section 15050, "Basic Mechanical Materials and Methods," for general piping materials and installation requirements.
2. Division 15 Section 15060, "Hangers and Supports," for pipe supports, product descriptions, and installation requirements. Hanger and support spacing is specified in this Section.

1.3 COORDINATION

A. Coordinate layout and installation of drain piping and suspension system components with other construction, including natural gas piping system.

B. Coordinate piping installation with roof curbs, equipment supports, and roof penetrations.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. General: Refer to Piping and Fitting Material Schedule on the Drawings for applications of pipe and fitting materials.

PART 3 - EXECUTION

3.1 PIPING INSTALLATIONS

A. Refer to Division 15 Section 15050, "Basic Mechanical Materials and Methods," for basic piping installation requirements.

B. Install drains, consisting of a tee fitting, threaded nipple with threaded cap for system cleanout. Provide cleanout at each change in direction and at connection to unit.

C. Install piping at a uniform grade of 0.2 percent downward in direction of flow.

D. Increase/reduce pipe sizes using eccentric reducer fitting installed with level side down.

E. Unless otherwise indicated, install branch connections to mains using tee fittings in main pipe.

3.2 HANGERS AND SUPPORTS

A. Supports are specified in Division 15 Section 15060, "Hangers and Supports."

B. Install supports for steel piping with the following maximum spacing and with continuous slope from unit connection to drain line termination.

1. NPS 3/4 (DN 20): Maximum span, 5 feet (1.5 meters).
2. NPS 1 (DN 25): Maximum span, 6 feet (1.8 meters).
3. NPS 1-1/2 (DN 40): Maximum span, 8 feet (2.4 meters).
4. NPS 2 (DN 50): Maximum span, 8 feet (2.4 meters).
5. NPS 2-1/2 (DN 65): Maximum span, 9 feet (2.7 meters).
6. NPS 3 (DN 80): Maximum span, 10 feet (3 meters).

3.3 PIPE JOINT CONSTRUCTION

A. Refer to Division 15 Section 15050, "Basic Mechanical Materials and Methods," and schedule on the drawings for joint construction requirements for soldered and brazed joints in copper tubing.

3.4 TERMINAL EQUIPMENT CONNECTIONS

A. Size for piping connections shall be same as for equipment connections. Increase pipe size at connection as indicated on Drawings.

3.5 CLEANING

A. Flush drain piping systems with clean water.

END OF SECTION 15170

SECTION 15181 - HYDRONIC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes piping, special-duty valves, and hydronic specialties for condenser water systems; makeup water for these systems; and blowdown drain lines.

B. Related Sections include the following:

1. Division 15 Section 15050, "Basic Mechanical Materials and Methods," for general piping materials and installation requirements.
2. Division 15 Section 15060, "Hangers and Supports," for pipe supports, product descriptions, and installation requirements.
3. Division 15 Section 15110, "Valves," for general-duty gate, globe, ball, butterfly, and check valves.
4. Division 15 Section 15971, "Building Management and Control System," for temperature-control valves and sensors.

1.3 SUBMITTALS

A. Product Data: For each type of hydronic specialty.

B. Welding Certificates: Copies of certificates for welding procedures and personnel.

C. Field Test Reports: Written reports of tests specified in Part 3 of this Section. Include the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Failed test results and corrective action taken to achieve requirements.

D. Maintenance Data: For hydronic specialties and special-duty valves to include in maintenance manuals specified in Division 1.

1.4 QUALITY ASSURANCE

A. Welding: Qualify processes and operators according to the ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

B. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.

1.5 COORDINATION

A. Coordinate layout and installation of hydronic piping and suspension system components with other construction, including light fixtures, HVAC equipment, and existing construction.

B. Coordinate pipe fitting pressure classes with products specified in related Sections.

C. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into base. Concrete, reinforcement, and formwork requirements are specified in Division 3 Sections.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. General: Comply with the piping material schedule on the drawings for product requirements of piping materials. For each system, provide the piping materials indicated including pipe, tube, fittings, hangers, supports, anchors, valves, and accessories. Where more than one type is indicated, selection is Installer's option. Provide materials and equipment indicated and as required for complete and functioning systems. Where type is not indicated, provide materials and equipment to comply with function and operation requirements.

2.2 MISCELLANEOUS

A. Welding Materials: Comply with Section II, Part C, of the ASME Boiler and Pressure Vessel Code for welding materials appropriate for wall thickness and for chemical analysis of pipe being welded.

B. Gasket Material: Thickness, material, and type suitable for fluid to be handled; and design temperatures and pressures.

2.3 VALVES

A. Gate and check valves are specified in Division 15 Section 15110, "Valves."

2.4 HYDRONIC SPECIALTIES

A. Manual Air Vent: Bronze body and nonferrous internal parts; 150-psig (1035-kPa) working pressure; 225 degrees F (107 degrees C) operating temperature; manually operated with screwdriver or thumbscrew; with NPS 1/8 (DN 6) discharge connection and NPS 1/2 (DN 15) inlet connection.

B. Automatic Air Vent: Designed to vent automatically with float principle; bronze body and nonferrous internal parts; 150-psig (1035-kPa) working pressure; 240 degrees F (116 degrees C) operating temperature; with NPS 1/4 (DN 8) discharge connection and NPS 1/2 (DN 15) inlet connection.

C. Y-Pattern Strainers: 125-psig (860-kPa) working pressure; cast-iron body, flanged ends for NPS 2-1/2 (DN 65) and larger, threaded connections for NPS 2 (DN 50) and smaller, bolted cover, perforated stainless-steel basket, and bottom drain connection.

D. Spherical, Rubber, Flexible Connectors: Fiber-reinforced rubber body with steel flanges drilled to align with Classes 150 and 300 steel flanges; operating temperatures up to 250 degrees F (121 degrees C) and pressures up to 150 psig (1035 kPa).

PART 3 - EXECUTION

3.1 VALVE APPLICATIONS

A. General-Duty Valve Applications: Unless otherwise indicated, use the following valve types:

1. Shutoff Duty: Gate valves.

B. Install shutoff duty valves at each branch connection to supply mains, at supply connection to each piece of equipment, unless only one piece of equipment is connected in the branch line. Install throttling duty valves at each branch connection to return mains, at return connections to each piece of equipment, and elsewhere as indicated.

C. Install check valves at each pump discharge and elsewhere as required to control flow direction.

3.2 PIPING INSTALLATIONS

A. Refer to Division 15 Section 15050, "Basic Mechanical Materials and Methods" for basic piping installation requirements.

B. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

C. Install drains, consisting of a tee fitting, NPS 3/4 (DN 20) ball valve, and short NPS 3/4 (DN 20) threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.

D. Install piping at a uniform grade of 0.2 percent upward in direction of flow.

E. Reduce pipe sizes using eccentric reducer fitting installed with level side up.

F. Unless otherwise indicated, install branch connections to mains using tee fittings in main pipe, with the takeoff coming out the bottom of the main pipe. For up-feed risers, install the takeoff coming out the top of the main pipe.

G. Install strainers on supply side of each control valve, pressure-reducing valve, solenoid valve, pump, and elsewhere as indicated. Install NPS 3/4 (DN 20) nipple and ball valve in blowdown connection of strainers NPS 2 (DN 50) and larger. Match size of strainer blowoff connection for strainers smaller than NPS 2 (DN 50).

3.3 HANGERS AND SUPPORTS

A. Hanger, support, and anchor devices are specified in Division 15 Section 15060, "Hangers and Supports." Comply with requirements below for maximum spacing of supports.

B. Install hangers for steel piping with the following maximum spacing and minimum rod sizes:

1. NPS 3/4 (DN 20): Maximum span, 7 feet (2.1 meters); minimum rod size, 1/4 inch (6.4 mm)
2. NPS 1 (DN 25): Maximum span, 7 feet (2.1 meters); minimum rod size, 1/4 inch (6.4 mm)
3. NPS 1-1/2 (DN 40): Maximum span, 9 feet (2.7 meters); minimum rod size, 3/8 inch (10 mm)
4. NPS 2 (DN 50): Maximum span, 10 feet (3 meters); minimum rod size, 3/8 inch (10 mm)
5. NPS 2-1/2 (DN 65): Maximum span, 11 feet (3.4 meters); minimum rod size, 3/8 inch (10 mm)
6. NPS 3 (DN 80): Maximum span, 12 feet (3.7 meters); minimum rod size, 3/8 inch (10 mm)
7. NPS 4 (DN 100): Maximum span, 14 feet (4.3 meters); minimum rod size, 1/2 inch (13 mm)
8. NPS 6 (DN 150): Maximum span, 17 feet (5.2 meters); minimum rod size, 1/2 inch (13 mm)
9. NPS 8 (DN 200): Maximum span, 19 feet (5.8 meters); minimum rod size, 5/8 inch (16 mm)
10. NPS 10 (DN 250): Maximum span, 20 feet (6.1 meters); minimum rod size, 3/4 inch (19 mm)
11. NPS 12 (DN 300): Maximum span, 23 feet (7 meters); minimum rod size, 7/8 inch (22 mm)

3.4 PIPE JOINT CONSTRUCTION

A. Refer to Division 15 Section 15050, "Basic Mechanical Materials and Methods," for joint construction requirements for threaded, welded, and flanged joints in steel piping.

3.5 HYDRONIC SPECIALTIES INSTALLATION

A. Install automatic air vents in mechanical equipment rooms only at high points of system piping, at heat-transfer coils, and elsewhere as required for system air venting.

3.6 FIELD QUALITY CONTROL

A. Prepare hydronic piping according to ASME B31.9 and as follows:

1. Leave joints, including welds, uninsulated and exposed for examination during test.
2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
3. Flush system with clean water. Clean strainers.
4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
5. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.

B. Perform the following tests on hydronic piping:

1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
2. While filling system, use vents installed at high points of system to release trapped air. Use drains installed at low points for complete draining of liquid.
3. Check expansion tanks to determine that they are not air bound and that system is full of water.
4. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the design pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed either 90 percent of specified minimum yield strength or 1.7 times "SE" value in Appendix A of ASME B31.9, "Building Services Piping."
5. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
6. Prepare written report of testing.

3.7 ADJUSTING

A. Mark calibrated nameplates of pump discharge valves after hydronic system balancing has been completed, to permanently indicate final balanced position.

B. Perform these adjustments before operating the system:

1. Open valves to fully open position.
2. Check pump for proper direction of rotation.
3. Set automatic fill valves for required system pressure.
4. Check air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).
5. Check operation of automatic bypass valves.
6. Check and set operating temperatures of chillers to design requirements.
7. Lubricate motors and bearings.

3.8 CLEANING

A. Flush hydronic piping systems with clean water. Remove and clean or replace strainer screens. After cleaning and flushing hydronic piping systems, but before balancing, remove disposable fine-mesh strainers in pump suction diffusers.

END OF SECTION 15181

SECTION 15185 - HYDRONIC PUMPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following categories of hydronic pumps for hydronic systems:

1. End-suction pumps.
2. Pump specialty fittings.

1.3 SUBMITTALS

A. Product Data: Include certified performance curves and rated capacities; shipping, installed, and operating weights; furnished specialties; final impeller dimensions; and accessories for each type of product indicated. Indicate pump's operating point on curves.

B. Shop Drawings: Show pump layout and connections. Include Setting Drawings with templates for installing foundation and anchor bolts and other anchorages.

1. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring.

C. Maintenance Data: For pumps to include in maintenance manuals specified in Division 1.

1.4 QUALITY ASSURANCE

A. UL Compliance: Fabricate and label pumps to comply with UL 778, "Motor-Operated Water Pumps," for construction requirements.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Manufacturer's Preparation for Shipping: Clean flanges and exposed machined metal surfaces and treat with anticorrosion compound after assembly and testing. Protect flanges, pipe openings, and nozzles with wooden flange covers or with screwed-in plugs.

B. Store pumps in dry location.

C. Retain protective covers for flanges and protective coatings during storage.

D. Protect bearings and couplings against damage from sand, grit, and other foreign matter.

E. Comply with pump manufacturer's written rigging instructions.

1.6 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3 Section "Cast-in-Place Concrete."

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Mechanical Seals: One mechanical seal for each pump.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equivalent:

1. Flexible-Coupled, End-Suction Pumps:

a. Aurora, 340 Series.
b. Bell and Gossett ITT; Div. of ITT Fluid Technology Corp., 1510 Series.
c. PACO Pumps., LF Series.
d. Peerless Pump Co., F Series.
e. TACO FI Series.
f. Patterson HVES Series.

2. Suction Diffusers:

a. Bell & Gossett ITT; Div. of ITT Fluid Technology Corp., "Suction Diffuser".
b. Taco, "Suction Diffuser".
c. Elbi, CISD Series.
d. Patterson SD Series.

3. Triple-Duty Valves:

a. Bell & Gossett ITT; Div. Of ITT Fluid Technology Corp., Model 3DS-S.
b. Taco, Model MPV.
c. Elbi, ETDV.
d. Patterson, TSV Series.

2.2 GENERAL PUMP REQUIREMENTS

A. Pump Units: Factory assembled and tested.

B. Motors: Include built-in, thermal-overload protection and grease-lubricated ball bearings. Select each motor to be nonoverloading over full range of pump performance curve.

2.3 FLEXIBLE-COUPLED, END-SUCTION PUMPS

A. Description: Base-mounted, centrifugal, flexible-coupled, end-suction, single-stage, bronze-fitted, back-pull-out, radially split case design; rated for 175 psig (1200 kPa) minimum working pressure and a continuous water temperature of 225 degrees F (107 degrees C).

1. Casing: Cast iron, with flanged piping connections, drain plug at low point of volute, threaded gage tappings at inlet and outlet connections, and integral feet or other means on volute to support weight of casing and attached piping. Casing shall allow removal and replacement of impeller without disconnecting piping.
2. Impeller: ASTM B 584, cast bronze, statically and dynamically balanced, closed, overhung, single suction, keyed to shaft, and secured by locking cap screw.
3. Wear Rings: Replaceable, bronze casing ring.
4. Shaft and Sleeve: Steel shaft with bronze sleeve.
5. Seals: Mechanical, with carbon-steel rotating ring, stainless-steel spring, ceramic seat, and flexible bellows and gasket.
6. Coupling: A Woods "S", Falk or Thomas "DBZ" coupling shall be provided between the pump and motor. The coupling shall be secured by set screws and 316 stainless steel shaft keys.
7. Coupling Guard: Steel, removable, and attached to mounting frame.
8. Mounting Frame: Welded-steel frame and cross members, factory fabricated from ASTM A 36/A 36M channels and angles. Fabricate for mounting pump casing, coupling guard, and motor. Field-drill motor-mounting holes for field-installed motors.

    a. Option: Cast-iron frames are acceptable.

9. Motor: Secured to mounting frame, with adjustable alignment.
10. Motor: TEFL with regreasable ball bearings.

B. Pump Selection:

1. Shall be such that the selection point is on the ascending portion of the performance curve or to the left of the best efficiency point of the selected impeller diameter. Pumps shall have a constantly rising curve from duty point to shut off. Impeller diameter shall be limited to a diameter equal to 90 percent or less than that of the maximum impeller diameter available for the pump size selected.
2. Pump selection shall not overload the motor at design and not more than 110 percent of nameplate horsepower at any point on curve.

2.4 PUMP SPECIALTY FITTINGS

A. Suction Diffuser: Angle or straight pattern, 175-psig (1200-kPa) pressure rating, cast-iron body and end cap, pump-inlet fitting; with bronze startup and bronze or stainless-steel permanent strainers; bronze or stainless-steel straightening vanes; drain plug; and factory- or field-fabricated support.

B. Triple-Duty Valve: Angle or straight pattern, 175-psig (1200-kPa) pressure rating, cast-iron body, pump-discharge fitting; with drain plug and bronze-fitted shutoff, balancing, and check valve features.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine equipment foundations and anchor-bolt locations for compliance with requirements for installation.

1. Examine roughing-in for piping systems to verify actual locations of piping connections before pump installation.
2. Examine foundations for suitable conditions where pumps are to be installed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PUMP INSTALLATION

A. Install pumps according to manufacturer's written instructions.

B. Install pumps to provide access for periodic maintenance, including removing motors, impellers, couplings, and accessories.

C. Support pumps and piping separately so piping is not supported by pumps.

D. Set base-mounted pumps on concrete foundation. Disconnect coupling halves before setting. Do not reconnect couplings until alignment operations have been completed.

1. Support pump baseplate on rectangular metal blocks and shims, or on metal wedges with small taper, at points near foundation bolts to provide a gap of 3/4 to 1-1/2 inches (19 to 38 mm) between pump base and foundation for grouting.
2. Adjust metal supports or wedges until pump and driver shafts are level. Check coupling faces and suction and discharge flanges of pump to verify that they are level and plumb.

3.3 ALIGNMENT

A. Align pump and motor shafts and piping connections after setting them on foundations, after grout has been set and foundation bolts have been tightened, and after piping connections have been made.

B. Comply with pump and coupling manufacturers' written instructions.

C. Adjust pump and motor shafts for angular and offset alignment by methods specified in HI 1.1-1.5, "Centrifugal Pumps for Nomenclature, Definitions, Application and Operation."

D. After alignment is correct, tighten foundation bolts evenly but not too firmly. Completely fill baseplate with nonshrink, nonmetallic grout while metal blocks and shims or wedges are in place. After grout has cured, fully tighten foundation bolts.

3.4 CONNECTIONS

A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to machine to allow service and maintenance.

C. Electrical power and control wiring and connections are specified in Division 16 Sections.

D. Ground equipment.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values.

3.5 COMMISSIONING

A. Verify that pumps are installed and connected according to the Contract Documents.

B. Verify that electrical wiring installation complies with manufacturer's written instructions and the Contract Documents.

C. Perform the following preventive maintenance operations and checks before starting:

1. Lubricate bearings.
2. Remove grease-lubricated bearing covers, flush bearings with kerosene, and clean thoroughly. Fill with new lubricant according to manufacturer's written instructions.
3. Disconnect coupling and check motor for proper rotation that matches direction marked on pump casing.
4. Verify that pumps are free to rotate by hand and that pumps for handling hot liquids are free to rotate with pumps hot and cold. Do not operate pumps if they are bound or drag, until cause of trouble is determined and corrected.
5. Check suction piping connections for tightness to avoid drawing air into pumps.
6. Clean strainers.
7. Verify that pump controls are correct for required application.

D. Starting procedure for pumps with shutoff power not exceeding safe motor power is as follows:

1. Prime pumps by opening suction valves and closing drains, and prepare pumps for operation.
2. Start motors.
3. Open discharge valves slowly.

4. Check general mechanical operation of pumps and motors.
5. Close circulating line valves once there is sufficient flow through pumps to prevent overheating.

E. When pumps are to be started against closed check valves with discharge shutoff valves open, steps are the same, except open discharge valves before starting motors.

F. Refer to Division 15 Section 15950, "Testing, Adjusting, and Balancing," for detailed requirements for testing, adjusting, and balancing hydronic systems.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train User's maintenance personnel to adjust, operate, and maintain hydronic pumps as specified below:

1. Train User's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining pumps.
2. Review data in maintenance manuals. Refer to Division 1 Section "Contract Closeout."
3. Schedule training with User, through Engineer, with at least seven days' advance notice.

END OF SECTION 15185

SECTION 15641 - OPEN CIRCUIT, MECHANICAL DRAFT COOLING TOWERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes factory-fabricated, induced draft, crossflow or counterflow cooling towers.

1.3 SUBMITTALS

A. Product Data: Include rated capacities, pressure drop, fan performance, rating curves with selected points indicated, startup instructions, furnished specialties, and accessories for each model indicated.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring.

C. Coordination Drawings: Show piping roughing-in requirements, wiring roughing-in requirements (determine spaces reserved for electrical equipment), and access requirements for service and maintenance.

D. Product Certificates: Signed by manufacturers of cooling towers to include certified performance curves plotting leaving-water temperature against wet-bulb temperature.

E. Maintenance Data: For each cooling tower to include in maintenance manuals specified in Division 1. Include part lists for tower fill, water distribution system, fans, bearings, controls, basin heaters, and accessories.

1.4 QUALITY ASSURANCE

A. Manufacturer's Certifications: Certify cooling tower's thermal performance according to CTI 201.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver cooling tower as a factory-assembled unit with protective crating and covering.

B. Rig units for unloading and moving as recommended by equipment manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equivalent:

1. Marley Aquatower.
2. Evapco USS Series.

2.2 INDUCED-DRAFT, CROSS-FLOW COOLING TOWERS

A. Description: Induced-draft, cross-flow or counterflow cooling tower that is factory fabricated and assembled.

B. Fan: Adjustable-pitch propeller type.

C. Hot-Water Distribution System: Evenly distributes water over fill material.

1. Hot-Water Basin: Stainless steel basin; removable polypropylene nozzles, and stainless steel basin covers.

D. Casing: Stainless steel.

E. Collecting Basin: Stainless steel.

F. Fill Material: PVC; resistant to rot, decay, and biological attack; with maximum flame-spread rating of five; and fabricated, formed, and installed by manufacturer to ensure that water breaks up into droplets.

G. Drift-Eliminator Material: PVC; resistant to rot, decay, and biological attack; with maximum flame-spread rating of five.

H. Louver Material: PVC; resistant to rot, decay, and biological attack; with maximum flame-spread rating of five.

I. Water-Level Control: Manufacturer's standard mechanical makeup water valve, and plastic or bronze float with an adjustable linkage. There shall be a minimum 2 inch air gap between the make-up water discharge and the overflow level of the basin.

J. Enclosure Type: Totally enclosed, fan cooled, energy efficient.

K. Motor Speed: Single speed, suitable for variable speed drive.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine proposed route of moving cooling towers into place and verify that it is free of interferences.

B. Examine elements and surfaces to support cooling tower.

C. Verify piping and wiring roughing-in locations.

D. Verify suitability of branch-circuit wiring.

3.2 INSTALLATION

A. Install cooling tower according to manufacturer's written instructions. Comply with manufacturer's instructions for field erection and installation.

B. Install cooling tower level and plumb, and fasten to supporting structure.

C. Install cooling tower so basin is at same elevation as existing cooling tower.

D. Maintain recommended clearances for service and maintenance.

E. Electrical Wiring: Install electrical devices furnished by cooling tower manufacturer that are not factory mounted.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties. The following are specific connection requirements:

1. Install piping adjacent to cooling towers to allow service and maintenance.
2. Pitch piping down to drain into sump.
3. Connect overflow drain and bleed lines as indicated.
4. Domestic Water Piping: Comply with applicable requirements of Division 23 Section 23 21 14, "Domestic Water Piping Systems." Connect to water-level control with shutoff valve and union or flange at each connection.
5. Condenser-Water Piping: Comply with applicable requirements of Division 23 Section 23 21 13, "Hydronic Piping." Connect to supply and return cooling-tower connections with shutoff valve, flow control valve, and union or flange on supply connection to the tower and shutoff valve and union or flange to return connection from the tower to the chiller.

B. Electrical: Comply with applicable requirements in Division 16 Sections.

C. Ground equipment.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect controls, field-assembled components and equipment installation, including piping and electrical connections. Report results in writing.

B. Set and balance condenser-water flow to each tower inlet.

C. Adjust water-level control for proper operating level.

D. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris, and repair damaged finishes including chips, scratches, and abrasions.

E. Complete installation and startup checks according to manufacturer's written instructions and do the following:

1. Clean entire unit and wash basins.
2. Ensure accessories are properly installed.
3. Check makeup water float.
4. Check clearances for airflow and for tower servicing.
5. Check for structural support.

F. Obtain wet-bulb, tower-size, and performance selection tables from manufacturer.

G. Lubricate bearings on fans and shaft as recommended by manufacturer.

H. Ensure fan wheels rotate in correct direction without vibration or binding.

I. Start cooling-tower and condenser-water pumps. Follow manufacturers written starting procedures.

J. Check water level in tower basin.

K. Check operation of tower basin and makeup line.

L. Check operation of controls.

M. Check operation of low water cutoff and control thermostat.

N. Ensure system chemical treatment is working, and measure chemical treatment levels. Check operation of tower basin automatic blow-down, and controlling device.

O. Verify that tower discharge is not recirculating into air intakes.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel as specified below:

1. Train Owner's maintenance personnel on procedures and schedules for starting up and shutting down, troubleshooting, servicing, and maintaining cooling towers, controls and VFDs.
2. Review data in maintenance manuals. Refer to Division 1 Sections.
3. Schedule training with Owner, through Engineer, with at least seven days' advance notice.
4. Provide a minimum of two each two hour training sessions for variable frequency drives.

END OF SECTION 15641

SECTION 15732 - ROOFTOP HEAT PUMPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following rooftop air conditioners:

1. Cooling and heating units 15 to 20 tons (26 to 70 kW).

1.3 DEFINITIONS

A. DDC: Direct-digital controls.

1.4 SUBMITTALS

A. Product Data: Include manufacturer's technical data for each model indicated, including rated capacities, dimensions, required clearances, characteristics, furnished specialties, and accessories.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

C. Field quality-control test reports.

D. Operation and Maintenance Data: For rooftop air conditioners to include in emergency, operation, and maintenance manuals.

E. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of rooftop air conditioners and are based on the specific system indicated.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Code for Mechanical Refrigeration."

D. Energy-Efficiency Ratio: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."

E. Coefficient of Performance: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."

F. ARI Certification: Units shall be ARI certified and listed.

G. ARI Compliance for Units with Capacities 135,000 Btuh (39.6 kW) and More: Rate rooftop air-conditioner capacity according to ARI 340/360, "Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment."

1. Sound Power Level Ratings: Comply with ARI 270, "Sound Rating of Outdoor Unitary Equipment."

H. Units shall be designed to operate with HCFC-free refrigerants.

1.6 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3.

B. Coordinate installation of roof curbs, equipment supports, and roof penetrations.

C. Coordinate size, location, and installation of rooftop air-conditioner manufacturer's roof curbs and equipment supports with roof installer.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to replace components of rooftop air conditioners that fail in materials or workmanship within specified warranty period.

1. Warranty Period for Compressors: Manufacturer's standard, but not less than 10 years from date of Substantial Completion.
2. Warranty Period for Control Boards: Manufacturer's standard, but not less than three years from date of Substantial Completion.
3. Warranty Period for Electronic Thermostats: Manufacturer's standard, but not less than three years from date of Substantial Completion.

1.8 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fan Belts: Two sets for each belt-drive fan.
2. Filters: Two sets of filters for each unit.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 ROOFTOP AIR CONDITIONERS 15 TO 20 TONS (26 TO 70 kW)

A. Available Manufacturers:

1. Lennox KHA Series.
2. Trane WS Series.
3. York XP Series.

B. Description: Factory assembled and tested; designed for exterior installation; consisting of compressor, indoor and outside refrigerant coils, indoor fan and outside coil fan, refrigeration and temperature controls, filters, and dampers.

C. Casing: Galvanized-steel construction with enamel paint finish, removable panels or access doors with neoprene gaskets for inspection and access to internal parts, minimum 1/2-inch- (13-mm-) thick thermal insulation, knockouts for electrical and piping connections, exterior condensate drain connection, and lifting lugs.

D. Indoor Fan: Forward curved, centrifugal, belt driven with adjustable motor sheaves, grease-lubricated ball bearings, and motor.

E. Outside Coil Fan: Propeller type, directly driven by permanently lubricated motor.

F. Refrigerant Coils: Aluminum-plate fin and seamless copper tube in steel casing with equalizing-type vertical distributor.

G. Compressor(s): Two hermetic scroll compressors with integral vibration isolators, internal overcurrent and overtemperature protection, internal pressure relief, and crankcase heater(s).

H. Refrigeration System:

1. Compressor(s).
2. Outside coil and fan.
3. Indoor coil and fan.
4. Four-way reversing valve and suction line accumulator.
5. Check valves.
6. Expansion valves with replaceable thermostatic elements.

7. Refrigerant dryers.
8. High-pressure switches.
9. Low-pressure switches.
10. Thermostats for coil freeze-up protection during low-ambient temperature operation or loss of air.
11. Independent refrigerant circuits.
12. Brass service valves installed in discharge and liquid lines.
13. Refrigerant Charge: R-410A.
14. Timed Off Control: Automatic-reset control shuts compressor off after five minutes.

I. Filters: 2-inch- (50-mm-) thick, fiberglass, pleated, throwaway filters in filter rack.

J. Electric Heat: Helix-wound, nickel-chrome, electric-resistance elements, factory wired for single-point wiring connection; with time delay for element staging, and overcurrent and overheat protective devices.

K. Outside-Air Damper: Linked damper blades, for 0 to 25 percent outside air, with fully modulating, spring-return damper motor and hood.

L. Power Connection: Provide for single connection of power to unit with control-circuit transformer with built-in circuit breaker.

M. Unit Controls: Solid-state control board and components contain at least the following features:

1. Indoor fan on/off delay.
2. Default control to ensure proper operation after power interruption.
3. Service relay output.
4. Unit diagnostics and diagnostic code storage.
5. Field-adjustable control parameters.
6. Defrost control.
7. Dehumidification control with dehumidistat.
8. Economizer control.
9. Electric heat staging.
10. Low-ambient control, allowing operation down to 0 deg F (minus 18 deg C).
11. Minimum run time.
12. Night setback mode.
13. Low-refrigerant pressure control.
14. Digital display of outside temperature, supply-air temperature, return-air temperature, economizer damper position, indoor-air quality, and control parameters.

N. DDC Temperature Control: Install stand-alone control module providing link between unit controls and DDC temperature-control system. Control module shall be compatible with temperature-control system specified in Division 15 Section "Building Management and Control System."

O. Thermostat: Programmable, electronic; with heating setback and cooling setup with seven-day programming; and the following:

1. Touch sensitive keyboard.
2. Automatic switching.
3. Deg F readout.

4. LED indicators.
5. Hour/day programming.
6. Manual override capability.
7. Time and operational mode readout.
8. Status indicator.
9. Battery backup.
10. Subbase with manual system switch (on-heat-auto-cool) and fan switch (auto-on).
11. Fan-proving switch to lock out unit if fan fails.
12. Dirty-filter switch.

P. Optional Accessories:

1. Cold-Weather Kit: Electric heater maintains temperature in gas burner compartment.
2. Service Outlets: Two, 115-V, ground-fault, circuit-interrupter type.
3. Copper condensate drain trap.
4. Dirty-filter switch.
5. Hail guards of steel, painted to match casing.

Q. Roof Curb: Steel with corrosion-protection coating, gasketing, and factory-installed wood nailer; complying with NRCA standards; minimum height of 14 inches (350 mm).

R. Horizontal Discharge Roof Curb: Where required, steel with corrosion-protection coating, insulation, gasketing, and factory-installed wood nailer, and configured to convert from downflow to horizontal airflow; complying with NRCA standards; minimum height of 37 inches (940 mm).

2.3 MOTORS

A. Comply with requirements in Division 15 Section "Motors."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install units level and plumb, maintaining manufacturer's recommended clearances.

B. Curb Support: Install roof curb on roof structure, level and secure, according to NRCA's "Low-Slope Membrane Roofing Construction Details Manual," Illustration "Raised Curb Detail for Rooftop Air Handling Units and Ducts." ARI Guideline B. Install and secure rooftop air conditioners on curbs and coordinate roof penetrations and flashing with roof construction.

C. Unit Support: Install unit level on structural curbs. Coordinate wall penetrations and flashing with wall construction. Secure units to structural support with anchor bolts.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Duct installation requirements are specified in other Division 15 Sections. Drawings indicate the general arrangement of ducts. The following are specific connection requirements:

1. Install ducts to termination in roof curb.
2. Remove roof decking only as required for passage of ducts. Do not cut out decking under entire roof curb.
3. Connect supply ducts to rooftop unit with flexible duct connectors specified in Division 15 Section "Duct Accessories."
4. Terminate return-air duct through roof structure and insulate space between roof and bottom of unit with 2-inch- (50-mm-) thick, acoustic duct liner.

C. Electrical System Connections: Comply with applicable requirements in Division 16 Sections for power wiring, switches, and motor controls.

D. Ground equipment according to Division 16 Section "Grounding and Bonding."

E. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.

B. Perform the following field quality-control tests and inspections and prepare test reports:

1. After installing rooftop air conditioners and after electrical circuitry has been energized, test units for compliance with requirements.
2. Inspect for and remove shipping bolts, blocks, and tie-down straps.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Remove malfunctioning units, replace with new units, and retest as specified above.

3.4 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

B. Complete installation and startup checks according to manufacturer's written instructions and do the following:

1. Inspect for visible damage to unit casing.
2. Inspect for visible damage to compressor, air-cooled outside coil, and fans.
3. Inspect internal insulation.
4. Verify that labels are clearly visible.

5. Verify that clearances have been provided for servicing.
6. Verify that controls are connected and operable.
7. Verify that filters are installed.
8. Clean outside coil and inspect for construction debris.
9. Lubricate bearings on fan.
10. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.
11. Adjust fan belts to proper alignment and tension.
12. Start unit according to manufacturer's written instructions.

    a. Start refrigeration system in summer only.
    b. Complete startup sheets and attach copy with Contractor's startup report.

13. Inspect and record performance of interlocks and protective devices; verify sequences.
14. Operate unit for an initial period as recommended or required by manufacturer.
15. Calibrate thermostats.
16. Adjust and inspect high-temperature limits.
17. Inspect outside-air dampers for proper stroke and interlock with return-air dampers.
18. Start refrigeration system and measure and record the following:

    a. Coil leaving-air, dry- and wet-bulb temperatures.
    b. Coil entering-air, dry- and wet-bulb temperatures.
    c. Outside-air, dry-bulb temperature.
    d. Outside-air-coil, discharge-air, dry-bulb temperature.

19. Inspect controls for correct sequencing of heating, mixing dampers, refrigeration, and normal and emergency shutdown.
20. Measure and record the following minimum and maximum airflows. Plot fan volumes on fan curve.

    a. Supply-air volume.
    b. Return-air volume.
    c. Relief-air volume.
    d. Outside-air intake volume.

21. Simulate maximum cooling demand and inspect the following:

    a. Compressor refrigerant suction and hot-gas pressures.
    b. Short circuiting of air through outside coil or from outside coil to outside-air intake.

22. Verify operation of remote panel, including pilot-light operation and failure modes. Inspect the following:

    a. Warm-up for morning cycle.
    b. Freezestat operation.
    c. Alarms.

23. After startup and performance testing, change filters, vacuum heat exchanger and cooling and outside coils, lubricate bearings, adjust belt tension, and inspect operation of power vents.

3.5 ADJUSTING

A. Adjust initial temperature and humidity set points.

B. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain rooftop air conditioners. Refer to Division 1 Section "Closeout Procedures."

END OF SECTION 15732

SECTION 15738 - SPLIT-SYSTEM HEAT PUMP UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes split-system heat pumps consisting of separate indoor air handling units with evaporator, electric resistance heater and fan and outdoor air-cooled condensing units with 2 compressors and condenser components. Indoor air handling units are designed for vertical mounting, and are connected to ducts. Outdoor units are air cooled and designed for roof curb mounting as indicated.

1.3 SUBMITTALS

A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated. Include performance data in terms of capacities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.

B. Shop Drawings: Diagram power, signal, and control wiring.

C. Field quality-control test reports.

D. Operation and Maintenance Data: For split-system heat pump units to include in emergency, operation, and maintenance manuals.

E. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of split-system units and are based on the specific system indicated.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.5 COORDINATION

A. Coordinate size, location, and connection details with equipment supports as indicated on the Drawings.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to the following:

a. Compressor failure.
b. Condenser or evaporator coil leak.

2. Warranty Period: Five years from date of Substantial Completion.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Filters: One set of filters for each unit.
2. Fan Belts: One set of belts for each belt drive unit.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following or approved equal:

	7 – 1/2 Ton	
	Cond. Unit	Air Unit
1. Trane	TWA	TWE
2. Lennox	TPA	TAA

2.2 INDOOR, EVAPORATOR-FAN COMPONENTS (AIR HANDLING UNITS)

A. Cabinet: Galvanized or enameled steel with removable panels on front and ends in color selected by Architect.

1. Insulation: Faced, glass-fiber, duct liner coated to prevent erosion of liner into air stream.
2. Drain Pans: Galvanized steel, with connection for drain; insulated drain trap.

B. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.

C. Electric Coil: Factory-installed; helical, nickel-chrome, resistance-wire heating elements with refractory ceramic support bushings; automatic-reset thermal cutout; built-in magnetic

contactors; manual-reset thermal cutout; airflow proving device; one-time fuses in terminal box for overcurrent protection; and required heating controls with control circuit transformer.

D. Fan: Variable speed direct drive, centrifugal, as indicated. Fan shall be forward-curve, statically and dynamically balanced.

E. Fan Motors: Comply with requirements in Division 15 Section 15055, "Motors."

1. Special Motor Features: Variable speed.
2. Internal thermal protection.
3. Permanently mounted.
4. Resiliently mounted.

F. Disposable Filters: 2 inches thick, 30 percent efficiency, pleated.

G. Filter Housing: Designed for 2 inch thick filter and equipped with hinged access door on each side of unit for easy filter removal/replacement.

H. Single Point Electrical Connections: Units shall have a single point of connection for all electrical power and shall be internally wired at the factory including fan, electric heat, and all required transformers, contactors, etc.

2.3 AIR-COOLED, OUTDOOR COMPRESSOR-CONDENSER COMPONENTS (AIR COOLED HEAT PUMP UNITS)

A. Casing: Steel, finished with baked enamel in manufacturer's standard color, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.

B. Compressor: Minimum 2 stage compressors, hermetically sealed with crankcase heater and mounted on vibration isolation. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.

1. Compressor Type: Scroll.

C. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with liquid subcooler.

D. Air conditioning Components: Reversing valve and low-temperature air cut-off thermostat.

E. Fan: Aluminum-propeller type, directly connected to motor, vertical discharge.

F. Motor: Permanently lubricated ball bearing, with integral thermal-overload protection on each leg.

G. Low Ambient Kit: Permits operation down to 10 degrees F.

H. Hail guard painted to match unit.

2.4 ACCESSORIES

A. Thermostat: Same as specified in Section 15732, “Rooftop Heat Pumps”.

B. Smoke Detectors: Smoke detectors with manual reset to automatically shut down the indoor unit fan and send a signal to the fire alarm system for the following systems are specified in Division 16 Section 16720, "Fire Alarm:"

1. Units with a scheduled fan capacity 2,000 cfm or greater. Locate smoke detectors in the duct system as follows:

a. In the supply air downstream of any filters and ahead of any branch connections.
b. In the return air upstream of any connection of exhaust or outside air.

C. Fire Protection Thermostats: Provide manual reset type adjustable fire protection thermostats set at 165 degrees F to automatically shut down the indoor unit fan for the following systems:

1. Units with a scheduled fan capacity less than 2,000 cfm. Locate thermostats in the duct systems as follows:

a. In the return air upstream of any connection of exhaust or outside air.

D. Refrigerant Piping: Refer to "Pipe and Fitting Material Schedule" on the Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install units level and plumb.

B. Provide hangers with vibration isolation springs for indoor units and suspend from structure securely fastened to building structure: Provide hangers with vibration isolators.

C. Install ground-mounting, compressor-condenser components on 4 inch (100 mm) thick, reinforced concrete base; 4 inches (100 mm) larger on each side than unit. Concrete, reinforcement, and formwork are specified in Division 3 Sections. Coordinate anchor installation with concrete base.

D. Install and connect refrigerant piping to component's fittings. Install piping to allow access to unit and route as indicated on the drawings. Do not bury refrigerant piping below grade.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to unit to allow service and maintenance.

C. Duct Connections: Duct installation requirements are specified in Division 15 Section 15815, "Metal Ducts." Drawings indicate the general arrangement of ducts. Connect supply and return ducts to split-system air conditioning units with flexible duct connectors. Flexible duct connectors are specified in Division 15 Section 15820, "Ductwork Accessories." Provide manual opposed blade dampers in return air and outside air ducts at the indoor unit.

D. Ground equipment according to Division 16 Section 16060, "Grounding and Bonding."

E. Electrical Connections: Comply with requirements in Division 16 Sections for power wiring, switches, and motor controls.

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections. Report results in writing.

B. Perform the following field tests and inspections and prepare test reports:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Remove and replace malfunctioning units and retest as specified above.

3.4 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units. Refer to Division 1.

END OF SECTION 15738

SECTION 15815 - METAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes metal ducts for supply, return, outside, and exhaust air-distribution systems in pressure classes from minus 2- to plus 10-inch wg (minus 500 to plus 2500 Pa). Metal ducts include the following:

1. Rectangular ducts and fittings.
2. Single-wall, round ducts and fittings.

B. Related Sections include the following:

1. Division 15 Section 15820, "Ductwork Accessories," for dampers, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.3 SYSTEM DESCRIPTION

A. Duct system design, as indicated, has been used to select size and type of air-moving and air-distribution equipment and other air system components. Changes to layout or configuration of duct system must be specifically approved in writing by Engineer. Accompany requests for layout modifications with calculations showing that proposed layout will provide original design results without increasing system total pressure.

1.4 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," for hangers and supports and AWS D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

B. Codes and Standards:

1. SMACNA Standards: "HVAC Duct Construction Standards, Metal and Flexible."
2. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
3. International Mechanical Code.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having G60 (Z180) coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.

C. Carbon-Steel Sheets: ASTM A 366/A 366M, cold-rolled sheets; commercial quality; with oiled, matte finish for exposed ducts.

D. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts.

E. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

2.2 SEALANT MATERIALS

A. Joint and Seam Sealants, General: The term "sealant" is not limited to materials of adhesive or mastic nature but includes tapes and combinations of open-weave fabric strips and mastics.

B. Joint and Seam Tape: 2 inches (50 mm) wide; glass-fiber-reinforced fabric.

2.3 HANGERS AND SUPPORTS

A. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches (100 mm) thick.
2. Exception: Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches (100 mm) thick.

B. Hanger Materials: Galvanized sheet steel or threaded steel rod.

1. Strap and Rod Sizes: Comply with SMACNA's, "HVAC Duct Construction Standards--Metal and Flexible" for steel sheet width and thickness and for steel rod diameters.

C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

D. Trapeze and Riser Supports: Steel shapes complying with ASTM A 36/A 36M.

1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
2. Supports for Stainless-Steel Ducts: Stainless-steel support materials.

2.4 RECTANGULAR DUCT FABRICATION

A. Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction according to SMACNA's, "HVAC Duct Construction Standards--Metal and Flexible" and complying with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.

1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure class.
2. Deflection: Duct systems shall not exceed deflection limits according to SMACNA's, "HVAC Duct Construction Standards--Metal and Flexible."

B. Transverse Joints: Prefabricated slide-on joints and components constructed using manufacturer's guidelines for material thickness, reinforcement size and spacing, and joint reinforcement.

C. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches (480 mm) and larger and 0.0359 inch (0.9 mm) thick or less, with more than 10 sq. feet (0.93 sq. meters) of non-braced panel area unless ducts are lined.

2.5 ROUND DUCT AND FITTING FABRICATION

A. Round, Snap Lock Longitudinal Seam Ducts: Fabricate supply ducts of galvanized steel according to SMACNA's, "HVAC Duct Construction Standards--Metal and Flexible."

PART 3 - EXECUTION

3.1 DUCT APPLICATIONS

A. Static-Pressure Classes: Unless otherwise indicated, construct ducts according to the following:

1. Supply Ducts: Low pressure, 2-inch wg (500 Pa).
2. Return Ducts (Negative Pressure): 1-inch wg (250 Pa).
3. Exhaust Ducts (Negative Pressure): 2-inch wg (500 Pa).

B. All ducts shall be galvanized steel.

3.2 DUCT INSTALLATION

A. Construct and install ducts according to SMACNA's, "HVAC Duct Construction Standards--Metal and Flexible," unless otherwise indicated.

B. Install round ducts in lengths not less than 12 feet (3.7 meters) unless interrupted by fittings.

C. Install ducts with fewest possible joints.

D. Install fabricated fittings for changes in directions, size, and shape and for connections.

E. Install couplings tight to duct wall surface with a minimum of projections into duct. Secure couplings with sheet metal screws. Install screws at intervals of 12 inches (300 mm), with a minimum of 3 screws in each coupling.

F. Install ducts, unless otherwise indicated, vertically and horizontally and parallel and perpendicular to building lines; avoid diagonal runs.

G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

H. Install ducts with a clearance of 1 inch (25 mm), plus allowance for insulation thickness.

I. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions unless specifically indicated.

J. Coordinate layout with suspended ceiling, fire- and smoke-control dampers, lighting layouts, and similar finished work.

K. Seal all joints and seams. Apply sealant to male end connectors before insertion, and afterward to cover entire joint and sheet metal screws.

L. Electrical Equipment Spaces: Route ducts to avoid passing through transformer vaults and electrical equipment spaces and enclosures.

M. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls and are exposed to view, conceal spaces between construction openings and ducts or duct insulation with sheet metal flanges of same metal thickness as ducts. Overlap openings on 4 sides by at least 1-1/2 inches (38 mm).

N. Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, install appropriately rated fire dampers, sleeves, and firestopping sealant. Fire and smoke dampers are specified in Division 15 Section 15820, "Ductwork Accessories."

O. Protect duct interiors from the elements and foreign materials until building is enclosed. Follow SMACNA's, "Duct Cleanliness for New Construction."

3.3 SEAM AND JOINT SEALING

A. Seal duct seams and joints according to SMACNA's, "HVAC Duct Construction Standards--Metal and Flexible" for duct pressure class indicated.

1. For pressure classes lower than 2-inch wg (500 Pa), seal transverse joints.

B. Seal and test ducts before external insulation is applied.

C. Test ducts in accordance with SMACNA. Make necessary repairs to sustain test pressure with not more than 5 percent leakage.

3.4 HANGING AND SUPPORTING

A. Support horizontal ducts within 24 inches (600 mm) of each elbow and within 48 inches (1200 mm) of each branch intersection.

B. Support vertical ducts at maximum intervals of 16 feet (5 meters) and at each floor.

C. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.

3.5 CONNECTIONS

A. Make connections to equipment with flexible connectors according to Division 15 Section 15820, "Ductwork Accessories."

B. Comply with SMACNA's, "HVAC Duct Construction Standards--Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

END OF SECTION 15815

SECTION 15820 - DUCTWORK ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

1.2 DESCRIPTION OF WORK

A. Extent of ductwork accessories work is indicated on the Drawings and in schedules and by requirements of this Section.

B. Types of ductwork accessories required for project include the following:

1. Low pressure manual dampers.
2. Fire dampers.
3. Turning vanes.
4. Duct hardware.
5. Duct access doors.
6. Flexible connections.
7. Flexible ducts.

C. Refer to other Division 15 Sections for testing, adjusting, and balancing of ductwork accessories; not work of this Section.

1.3 QUALITY ASSURANCE

A. Codes and Standards:

1. SMACNA Compliance: Comply with applicable portions of SMACNA, "HVAC Duct Construction Standards, Metal and Flexible."
2. UL Compliance: Construct, test, and label fire dampers in accordance with UL Standard 555, "Fire Dampers and Ceiling Dampers."
3. NFPA Compliance: Comply with applicable provisions of NFPA 90A, "Air Conditioning and Ventilating Systems" pertaining to installation of ductwork accessories.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data for each type of ductwork accessory, including dimensions, capacities, and materials of construction and installation instructions.

B. Maintenance Data: Submit manufacturer's maintenance data including parts lists for each type of duct accessory. Include this data and product data in maintenance manual; in accordance with requirements of Division 1 and Division 15 Section 15050, "Basic Mechanical Materials and Methods."

PART 2 - PRODUCTS

2.1 DAMPERS

A. Low Pressure Manual Dampers: Provide manual volume dampers constructed of galvanized steel.

1. Square and Rectangular Dampers: Dampers shall have minimum 20 gauge frames and minimum 20 gauge roll formed blades. Multi-blade dampers shall have interlocking corrugated edges. Damper linkage shall be concealed in the damper frame. Dampers for ducts smaller than 36 inches by 12 inches may be single blade dampers, all other dampers shall have multiple blades. Provide opposed blade type unless indicated otherwise.
2. Round Dampers: Dampers shall be minimum 20 gauge frame and 20 gauge blade. Blade shall be secured to 3/8 inch square or 1/2 inch diameter galvanized or plated axle/shaft that extends beyond frame through bearings and locking hand quadrant.
3. Dampers shall include permanently lubricated oilite bronze bearings pressed securely into damper frame.
4. Dampers shall include factory furnished locking quadrants with a 2 inch elevated dial and "OPEN" and "CLOSED" indicators.

B. Manufacturer: Subject to compliance with requirements, provide balancing dampers of one of the following or approved equivalent:

		Single Blade	Opposed Blade	Parallel Blade	Round Blade
1.	Ruskin	MD35	MD35	MD35	MDRS25
2.	Greenheck	MBD-15	MBD-15	MBD-15	
3.	Pottoroff	CD10	MD42	MD41	CD10R

2.2 TURNING VANES

A. Fabricated Turning Vanes: Provide fabricated turning vanes and vane runners, constructed in accordance with SMACNA, "HVAC Duct Construction Standards."

2.3 DUCT HARDWARE

A. General: Provide duct hardware, manufactured by one manufacturer for all items on project, for the following:

1. Test Holes: Provide in ductwork at fan inlet and outlet and elsewhere as indicated, duct test holes, consisting of slot and cover, for instrument tests.
2. Quadrant Locks: Provide quadrant lock device on one end of shaft and end bearing plate on other end for damper lengths over 12 inches. Provide 2 inches extended quadrant locks and 2 inches end extended bearing plates for externally insulated ductwork.

    a. Duro-dyne, Model 8021.
    b. Young, Model 443B/404B.

3. Concealed dampers that are not accessible shall be controlled by a concealed regulator, type as indicated. Where type is not indicated, provide type as recommended by manufacturer for application. Include flush chrome plated access panel for each.

a. Duro-dyne, Model 8009.
b. Young, Model 301/315.

4. Spin-In Fittings:

a. Flexmaster U.S.A., Inc., Model CB.
b. Sheet Metal Connectors, Inc., Model G.
c. Dace, Model CONSP-P.

5. High Efficiency Takeoffs (Rectangular Tap with Transition to Round Branch):

a. Sheet Metal Connectors, Inc., Model HET (24 gage).
b. Dace, STO Series.
c. Field fabricated as detailed on the Drawings.

2.4 DUCT ACCESS DOORS

A. General: Provide where indicated, duct access doors of size indicated.

B. Construction: Construct of same or greater gage as ductwork served; provide insulated doors for insulated ductwork with minimum 1 inch insulation k-valve = 0.26 at 75 degrees F mean temperature sandwiched between sheetmetal panels. Provide flush frames for uninsulated ductwork; extended frames for externally insulated duct. Provide one side hinged, other side with one handle-type latch for doors 12 inches high and smaller, 2 handle-type latches for larger doors. Screwdriver operated latches are not acceptable.

2.5 FLEXIBLE CONNECTIONS

A. Provide flexible duct connections wherever ductwork connects to HVAC equipment, fans or other vibration isolated equipment. Construct flexible connections of neoprene-coated flameproof fabric crimped into duct flanges for attachment to duct and equipment. Make airtight joint. Provide adequate joint flexibility to allow for thermal, axial, transverse, and torsional movement, and also capable of absorbing vibrations of connected equipment.

2.6 FLEXIBLE DUCTS

A. Manufacturers:

1. Flexmaster U.S.A., Inc.
2. Hart & Cooley, Inc.
3. Thermaflex.

B. Insulated-Duct Connectors: UL 181, Class 1, liner of multiple layers of aluminum laminate supported by helically wound, galvanized or coated spring-steel wire; fibrous-glass insulation; aluminized vapor barrier film.

1. Pressure Rating: 10-inch wg (2500 Pa) positive and 1.0-inch wg (250 Pa) negative.
2. Rated Air Velocity: 4000 fpm (20.3 m/s).
3. Temperature Range: Minus 20 to plus 210 degrees F (Minus 28 to plus 99 degrees C).

4. Flame Spread: Less than 25.
5. Smoke Developed: Less than 50.
6. Thermal Conductance: C Factor not more than 0.23.

C. Flexible Duct Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action, in sizes to suit duct size.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine areas and conditions under which ductwork accessories will be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 INSTALLATION OF DUCTWORK ACCESSORIES

A. Install ductwork accessories in accordance with manufacturer's installation instructions, with applicable portions of details of construction as shown in SMACNA standards, and in accordance with recognized industry practices to ensure that products serve intended function.

B. Where ducts take off mains, and where ducts divide, install splitter dampers or volume dampers, each with adjustable locking quadrant control. Provide volume damper unless splitter damper is indicated. Provide adjustable pivoting splitter with locking quadrant control for all splitter dampers. Provide a volume damper after each splitter damper, located in the branch with the lowest resistance.

C. Concealed dampers that are not accessible shall be controlled by a concealed regulator, type as indicated. Where type is not indicated, provide type as recommended by manufacturer for application. Include flush chrome plated access panel for each.

D. Install turning vanes in all square or rectangular 90 degree elbows in supply, return, and exhaust air systems, and elsewhere as indicated.

E. Install access doors to open against system air pressure, with latches operable from either side, except outside only where duct is too small for person to enter.

F. Install flexible ducts only where indicated and only in extended straight lengths not to exceed 36 inches; bend, sags, or elbows will not be permitted.

G. Coordinate with other work, including ductwork, as necessary to interface installation of ductwork accessories properly with other work.

3.3 FIELD QUALITY CONTROL

A. Operate installed ductwork accessories to demonstrate compliance with requirements. Test for air leakage while system is operating. Repair or replace faulty accessories, as required to obtain proper operation and leak-proof performance.

3.4 ADJUSTING AND CLEANING

A. Adjusting: Adjust ductwork accessories for proper settings, install fusible links in fire dampers, and adjust for proper action.

B. Final positioning of manual dampers is specified in Division 15 Section 15950, "Testing, Adjusting, and Balancing."

C. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

END OF SECTION 15820

SECTION 15855 - DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes ceiling- and wall-mounted diffusers, registers, and grilles.

1.3 SUBMITTALS

A. Product Data: For each product indicated, include the following:

1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
2. Diffuser, Register, and Grille Schedule: Indicate model number and accessories furnished.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. The following requirements apply to product selection:

1. Products: Subject to compliance with requirements, provide one of the products scheduled on the Drawings.

2.2 SOURCE QUALITY CONTROL

A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install diffusers, registers, and grilles level and plumb.

B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practicable. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.3 ADJUSTING

A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 15855

SECTION 15950 - TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

1.2 DESCRIPTION OF WORK

A. The extent of test-adjust-balance (TAB) work is indicated by the requirements of this Section, and also by the Drawings and schedules, and is defined to include, but is not necessarily limited to, air distribution systems, and associated equipment and apparatus of HVAC work. The work consists of setting speed and volume (flow) adjusting facilities provided for the systems, recording data, conducting tests, preparing and submitting reports, and recommending modifications to the work as required by the contract documents.

B. The component types of testing, adjusting and balancing specified in this Section includes the following as applied to HVAC equipment:

1. Rooftop air conditioning units.
2. Split system air conditioning units.
3. Fans.
4. Condenser water pumps.
5. Chiller condenser.
6. Ductwork systems.
7. Temperature Controls.

1.3 QUALITY ASSURANCE

A. Installer: A TAB firm with at least 3 years of successful test-adjust-balance experience on projects with testing and balancing requirements similar to those required for this project who is not the Installer of system to be tested and is otherwise independent of the project.

B. NEBB Compliance (Option): Comply with NEBB's, "Procedural Standards for Testing-Adjusting-Balancing of Environmental Systems" as applicable to HVAC air distribution systems and associated equipment and apparatus.

C. AABC Compliance (Option): Comply with AABC's Pub. No. 12173, "National Standards for Field Measurements and Instrumentation, Total System Balanced," as applicable to HVAC air and hydronic distribution system and associated equipment and apparatus.

D. Industry Standards: Comply with ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.) recommendations pertaining to measurements, instruments and testing, adjusting, and balancing, except as otherwise indicated.

1.4 SUBMITTALS

A. Submit certified test report signed by the Test and Balance Supervisor who performed the TAB work.

B. Include identification and types of instruments used and their most recent calibration date with submission of final test report.

1.5 JOB CONDITIONS

A. Do not proceed with testing, adjusting, and balancing work until the work to be TAB'ed has been completed and is operable. Ensure that there is no latent residual work still to be completed.

B. Do not proceed until the work scheduled for TAB'ing is clean and free from debris, dirt, and discarded building materials.

PART 2 - PRODUCTS

2.1 PATCHING MATERIALS

A. Except as otherwise indicated, use same products as used by original Installer for patching holes in insulation, ductwork and housing which have been cut or drilled for test purposes, including access for test instruments, attaching jigs, and similar purposes.

B. At Tester's option, plastic plugs with retainers may be used to patch drilled holes in ductwork and housings.

2.2 TEST INSTRUMENTS

A. Utilize test instruments and equipment for the TAB work required, of the type, precision, and capacity as recommended in the following TAB standards:

1. NEBB's Procedural Standards for Testing-Adjusting-Balancing of Environmental Systems.
2. AABC's National Standards for Field Measurements and Instrumentation, Total Balance System.

PART 3 - EXECUTION

3.1 GENERAL

A. Tester must examine the installed work and conditions under which testing is to be done to ensure that work has been completed, cleaned and is operable. Notify the Contractor in writing of conditions detrimental to the proper completion of the test-adjust-balance work.

B. Do not proceed with the TAB work until unsatisfactory conditions have been corrected in a manner acceptable to the Tester.

C. Test, adjust and balance the environmental systems and components, as indicated, in accordance with the procedures outlined in applicable standards. In addition perform the following:

1. Test all safety devices for proper operation.
2. Adjust gas burners and gas inputs per manufacturer's recommendations.
3. Calibrate temperature control systems and adjust heat anticipators per manufacturer's recommendations.
4. Test smoke detector as recommended by manufacturer.

D. Test, adjust and balance system during the summer for air conditioning systems and during winter for heating systems, including at least a period of operation at outside conditions within 5 degrees F wet bulb temperature of maximum summer design condition, and within 10 degrees F dry bulb temperature of minimum winter design condition. When seasonal operation does not permit measuring the final temperatures then take the final temperature readings when the seasonal operation does permit.

E. Prepare report of test results, including instrumentation calibration reports, in format recommended by the applicable standards. In addition certify that safety devices have been checked and are operating properly, that gas inputs and gas burners have been adjusted in accord with manufacturer's recommendations, that temperature control systems have been calibrated and are operating properly, that smoke detector is operating properly, and that heat anticipators have been adjusted in accord with manufacturer's recommendations.

F. Patch holes in insulation, ductwork, and housings, which have been cut or drilled for test purposes, in a manner recommended by the original Installer.

G. Mark equipment settings, including damper control positions, valve indicators, fan speed control levers, and similar controls and devices, to show final settings at completion of TAB work. Provide markings with paint or other suitable permanent identification materials.

H. Prepare a report of recommendations for correcting unsatisfactory HVAC performances when system cannot be successfully balanced.

I. Retest, adjust, and balance system subsequent to significant system modifications or if report is unsatisfactory, and resubmit test results. Repeat until satisfactory results are obtained.

END OF SECTION 15950

SECTION 15971 - BUILDING MANAGEMENT AND CONTROL SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work specified in this Section.

1.2 DESCRIPTION OF WORK

A. Provide factory trained service technician OEM of the Building Management and Control System (BMCS) to provide all disconnection, removal, and reconnection of all BMCS components as required on this project. Provide power down sequencing of the BMCS components on-site, so no damage to the existing BMCS panel will occur.

B. Provide re-installation of all BMCS components and termination to existing BMCS panel as indicated in the points list. Include all graphics and database changes as required to re-map existing points to new. Replace sensors and components as required to make the system fully functional. Provide new condenser water reset valves and actuators.

C. Provide submittals, start up, test and validation of BMCS, instruction of Owner's representative on maintenance and operation of BMCS, and as built composite diagrams showing interlocks between equipment furnished under this and other sections and controls herein.

D. Provide report of check out and successful commissioning of BMCS.

1.3 WORK BY OTHERS

A. Setting in place of valves, flow meters, water pressure and differential taps, flow switches, and thermal wells.

B. Wiring for the BMCS is included as a part of the work specified by this Section. Building power wiring to control panels and equipment is included in Division 16. Interlock wiring required for mechanical equipment is included as a part of work specified by this Section except work shown on the Electrical Drawings and/or specified in Division 16.

1.4 QUALITY ASSURANCE

A. Codes and Approvals:

1. The complete BMCS installation shall be in strict accordance to the national and local electrical codes and the electrical section of these Specifications. All devices designed for or used in line voltage applications shall be UL listed.

2. The system shall comply with NFPA 90A Air Conditioning and 90B Warm Air Heating, Air conditioning.

B. Acceptance: The BMCS contractor shall completely check out, calibrate and test all connected hardware and software to insure that the system performs in accordance with the approved specifications and sequences of operations approved.

C. Manuals: The following manuals will be provided:

1. A manual shall be provided including revised as-built documents of all materials required under the paragraph "SUBMITTALS" on this specification.
2. Two Operators Manuals, and two As-Built Manuals shall be provided to the owner.

D. Warranty: All components, system software, and parts supplied by the BMCS contractor shall be guaranteed against defects in materials and workmanship for one year from acceptance date. Labor to repair or replace components shall be furnished by the BMCS contractor at no charge during the warranty period. All corrective software modifications made during warranty periods shall be updated on all user documentation and on user and manufacturer archived software disks.

PART 2 - PRODUCTS

2.1 ELECTRIC AND MECHANICAL AND DEVICES

A. All electric switch devices shall be selected for the applied load and UL listed for the application. Miscellaneous, electric, pneumatic, and mechanical devices shall include:

B. Automatic control valves 2 inches and smaller shall be screwed type, and valves 2-1/2 inches and larger shall be flanged. Valves shall be ANSI-rated to withstand the pressures and temperatures encountered. Valves shall have stainless-steel stems and spring loaded Teflon packaging with replaceable discs.

2.2 DATA INPUTS AND OUTPUTS

A. Input/output sensors and devices shall be closely matched to the requirements of the remote panel for accurate, responsive, noise-free signal input/output. Control input response shall be high sensitivity and matched to the loop gain requirements for precise and responsive control. In no case shall computer inputs be derived from pneumatic sensors.

B. Temperature sensors shall be Resistance Temperature Detector (RTD) type of 100, 1000, or 3,000 ohm platinum, 500 ohm Balco, or 20,000 ohm. Sensors shall have + or - 1.0 degrees F accuracy between 32 degrees and 212 degrees.

C. Water flow analog sensors shall be provided complete with flow element and shall be an all solid state precision industrial type with stainless-steel meter body, maximum error of no more than .5 percent of span, and 4 to 20 mA output. Sensor shall be rated for 250 psi minimum and installed in strict accordance to the manufacturer's instructions complete with three-valve manifold for calibration and maintenance.

D. Current sensing relays used for proof-of-loading for fans and pumps shall be suitable for 2 to 200 amperes and shall have adjustable trip thresholds of plus or minus two percent of range. Each relay shall be provided with an LED to allow ready observation of the relay status.

PART 3 - EXECUTION

3.1 GENERAL

A. The BMCS shall be designed, installed, and commissioned in a turnkey operational manner; including all labor not noted in "Work by Others" paragraph of PART I of this Section of these Specifications, and not noted in other Sections of these Specifications.

3.2 DATA CONTROL (D/C) AND GRAPHICS SUMMARY

A. All hardware, custom software, application software, graphics, etc., necessary to accomplish the control sequences and display the graphics specified shall be provided as part of this contract. Provide all controllers, inputs, outputs, valves, dampers, actuators and flow meters required to provide the control and graphic data described. Provide software setpoints required for display in logical groups and graphics.

3.3 SUBMITTALS

A. Provide 5 copies of submittal data within 60 days of contract award.

B. Submittal shall consist of:

1. System architecture showing all digital devices.
2. Equipment lists of all proposed devices and equipment including data sheets of all products.
3. Valve, damper, and well and tap schedules showing size, configuration, capacity and location of all equipment.
4. Wiring and piping interconnection diagrams including panel and device power and sources.

3.4 INSTALLATION

A. Provide all BMCS and HVAC motor control wiring, including interlock wiring, both line and low voltage, and any other electrical work required for the control and operation of the BMCS and other control systems that are not shown on the electrical drawings. All wiring shall be in raceways and shall comply with applicable provisions of Division 16 and manufacturer's recommendations.

B. The BMCS contractor shall enter all computer data into the related computers including all graphics, control programs, initial approved parameters and settings, and English descriptors. The BMCS contractor shall maintain diskette copies of all data file and application software for reload use in the event of a system crash or memory failure. One copy shall be delivered to the

owner during training sessions, and one copy shall be archived in the BMCS contractor's local software vault.

3.5 POINTS LIST

A. The following points shall be required for the new cooling towers:

1.	Cooling Tower Fan Status (point for each fan)	On/Off
2.	Cooling Tower Fan Vibration Switch (point for each fan)	Normal/Alarm
3.	Cooling Tower Low Level	Normal/Alarm
4.	Condenser water pump	Status

B. The following points shall be require for the new rooftop heat pumps and split system heat pumps.

1. All available output through BACnet protocol.

C. The following points shall be required for the cooling tower for motor VFD’s under additive Alternate No. 1:

1. Cooling Tower #1 VFD’s, all available output through BACnet protocol.

D. The following points shall be required for the new condenser water pump under Additive Alternate No. 2:

1.	Condenser Water Pump Status	On/Off

END OF SECTION 15971

SECTION 16050 - BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Codes and Standards: Where indicated, the referenced edition shall govern. Where not indicated, the latest edition shall govern.

1.2 SUMMARY

A. This Section includes the following:
1. Supporting devices for electrical components.
2. Electrical identification.
3. Control wiring.
4. Electrical demolition.
5. Cutting and patching for electrical construction.
6. Touchup painting.

1.3 SUBMITTALS

A. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

B. Record Drawings: Where installed circuit designations do not match the Drawings, indicate actual designations.

1.4 DEFINITIONS

A. General Explanation: A substantial amount of the Contract Document Specification language constitutes specific definitions for terms found in other Contract Documents, including the Drawings which must be recognized as diagrammatic in nature and not completely descriptive of the requirements indicated thereon. Certain terms used repetitiously in the Contract Documents are defined generally in this Article.

B. General Requirements: The provisions or requirements of the Division 1 Sections. The General Requirements apply to the entire work of the Contract, and where so indicated, to other elements of work which are included in the project.

C. Indicated: The term "Indicated" is a cross reference to details, notes or schedules on the Drawings, other paragraphs or schedules in the Specifications, and similar means of recording requirements in the Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used in lieu of "indicated," it is for the purpose of helping the reader locate the cross reference, and no limitation of location is intended except as specifically noted.

D. Directed, Requested, Etc.: Where not otherwise explained, terms such as "directed," "requested," "authorized," "selected," "approved," "required," "accepted," and "permitted" mean "directed by the Engineer," "requested by the Engineer," etc. However, no such implied meaning will be interpreted to extend the Engineer's responsibility into the Contractor's area of construction supervision.

E. Refer: Used to indicate that the subject is defined or specified in further detail at another location in the Contract Documents, or elsewhere as indicated. Except as otherwise noted, "refer" does not imply that the Contractor must purchase or subcontract the subject work in any special manner.

F. Approve: Where used in conjunction with the Engineer's response to submittals, requests, applications, inquiries, reports and claims by the Contractor, the meaning of the term "approved" will be held to the limitations of the Engineer's responsibilities and duties as specified in the General and Supplementary Conditions. In no case will "approval" by the Engineer be interpreted as a release of the Contractor from responsibilities to fulfill the requirements of the Contract Documents.

G. Project Site: The space available to the Contractor for the performance of the work, either exclusively or in conjunction with others performing other work as part of the project. The extent of the project site may or may not be identical with the description of the land upon which the project is to be built.

H. Furnish: Except as otherwise defined in greater detail, the term "furnish" is used to mean supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each instance.

I. Install: Except as otherwise defined in greater detail, the term "install" is used to describe operations of the project site including unloading, unpacking, assembly, erection, placing, anchoring, connecting utilities, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations, as applicable in each instance.

J. Provide: Except as otherwise defined in greater detail, the term "provide" means furnish and install, complete and ready for the intended use, as applicable in each instance.

K. Installer: The entity (person or firm) engaged by the Contractor or its subcontractor or sub-subcontractor for the performance of a particular unit of work at the project site, including installation, erection, application and similar required operations. It is a general requirement that such entities (Installers) be expert in the operations they are engaged to perform.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70 (2011).

1.6 HAZARDOUS MATERIALS

A. Asbestos: No asbestos-containing materials have been identified on items that are indicated to be disturbed. If asbestos-containing materials are encountered, comply with the following:

1. Upon encountering any previously unidentified materials which he suspects may contain asbestos, the Contractor shall immediately cease all work in the immediate vicinity of the suspected materials and notify the Designer and the Owner. The Owner shall retain consultants to identify the suspected materials. Upon identification, the Owner reserves the right to contract separately for the removal, or require the Contractor to remove said materials in accordance with the following provision. In any case, the work shall be performed by a licensed and certified Abatement Contractor.
2. The Louisiana Department of Environmental Quality (D.E.Q.) has issued the Louisiana Emission Standards for Hazardous Air Pollutants. Where asbestos is encountered in a project, the Contractor shall comply with all laws and ordinances pertaining to asbestos handling and abatement, including the latest revision of LAC 33:111, Chapter 25, Subchapter F, Emission Standards for Hazardous Air Pollutants, LAC 33:111, Chapter 27, Asbestos Containing Materials in Schools and Public Buildings and LAC 33:111, Chapter 51, Subchapter M, Section 5151, Emission Standards for Asbestos.
3. Notification should be addressed to: Asbestos Coordinator; Louisiana Department of Environmental Quality; Air Quality Division; Post Office Box 82135; Baton Rouge, LA 70884-2135
4. If the Owner chooses to remove any previously unidentified materials by utilizing different Contractors, the Contractor shall cooperate fully with the Owner's consultants and asbestos abatement Contractor permitting them full access to the project, and shall not resume work in the vicinity of the suspected materials until advised by the Designer and the Owner that it is safe to do so.

1.7 COORDINATION

A. The electrical Plans and Specifications are a portion of the entire project. Other portions of the project contain information and requirements that will affect the electrical work. It is the responsibility of the Electrical Contractor to review all of the Contract Documents and to include those requirements in the bid.

B. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.

PART 2 - PRODUCTS

2.1 SUPPORTING DEVICES

A. Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.

B. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel.

C. Slotted-Steel Channel Supports: Flange edges turned toward web, and 9/16 inch (14 mm) diameter slotted holes at a maximum of 2 inches (50 mm) o.c., in webs.

D. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.

E. Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.

F. Expansion Anchors: Carbon-steel wedge or sleeve type.

G. Toggle Bolts: All-steel springhead type.

H. Powder-Driven Threaded Studs: Heat-treated steel.

2.2 ELECTRICAL IDENTIFICATION

A. Identification Devices: A single type of identification product for each application category. Use colors prescribed by ANSI A13.1, NFPA 70, and these Specifications.

B. Cable Labels: Comply with ANSI A13.1, Table 3, for minimum size of letters for legend and minimum length of color field for each cable size.

1. Type: Preprinted, flexible, self-adhesive, vinyl. Legend is overlaminated with a clear, weather- and chemical-resistant coating.

C. Colored Adhesive Marking Tape for Wires, and Cables: Self-adhesive vinyl tape, not less than 3/4 inch wide by 3 mils thick (18 mm wide by 0.08 mm thick).

D. Tape Markers for Wire: Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.

E. Engraved-Plastic Labels, Signs, and Instruction Plates: Engraving stock, melamine plastic laminate punched or drilled for mechanical fasteners 1/16 inch (1.6 mm) minimum thickness for signs up to 20 sq. inch (129 sq. cm) and 1/8 inch (3.2 mm) minimum thickness for larger sizes. Engraved legend in black letters on white background.

F. Interior Warning and Caution Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145. Preprinted, aluminum, baked-enamel-finish signs, punched or drilled for mechanical fasteners, with colors, legend, and size appropriate to the application.

G. Exterior Warning and Caution Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396 inch (1 mm), galvanized-steel backing, with colors, legend, and size appropriate to the application. 1/4 inch (6 mm) grommets in corners for mounting.

H. Fasteners for Nameplates and Signs: Self-tapping, stainless-steel screws or No. 10/32 stainless-steel machine screws with nuts and flat and lock washers.

2.3 TOUCHUP PAINT

A. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.

B. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

PART 3 - EXECUTION

3.1 ELECTRICAL EQUIPMENT INSTALLATION

A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom, but no less than that required by NEC.

B. Clearances: Coordinate with other trades and/or existing conditions to maintain code required clearances above, below and around electrical equipment.

C. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.

3.2 ELECTRICAL SUPPORTING DEVICE APPLICATION

A. Damp Locations and Outdoors: Hot-dip galvanized materials or nonmetallic, U-channel system components.

B. Dry Locations: Steel materials.

C. Selection of Supports: Comply with manufacturer's written instructions.

D. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four; minimum of 200 lb (90 kg) design load.

3.3 SUPPORT INSTALLATION

A. Install support devices to securely and permanently fasten and support electrical components.

B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.

C. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.

D. Size supports for multiple raceway installations so capacity can be increased by a 25 percent minimum in the future.

E. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps. Clamps less than 7 feet above the floor shall be one-piece without protruding edges or bolts.

F. Install 1/4 inch (6 mm) diameter or larger threaded steel hanger rods, unless otherwise indicated.

G. Spring-steel fasteners specifically designed for supporting single conduits or tubing may be used instead of malleable-iron hangers for 1-1/2 inch (38 mm) and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings and for fastening raceways to slotted channel and angle supports. Support wires shall be dedicated to the support of electrical materials and equipment. Ceiling support equipment and wires are not to be used for the support of electrical equipment. Identify electrical support wires as required by 2011 NFPA 70 300.11(A)(2).

H. Install metal channel racks for mounting cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength. Field galvanize galvanized members that have been field cut.

I. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves for raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies.

J. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:

1. Wood: Fasten with wood screws or screw-type nails.
2. Masonry: Toggle bolts on hollow masonry units and expansion bolts on solid masonry units.
3. Existing Concrete: Expansion bolts.
4. Instead of expansion bolts, threaded studs driven by a powder charge and provided with lock washers may be used in existing concrete.
5. Steel: Welded threaded studs or spring-tension clamps on steel. No field welding of supports to structural members will be allowed.
6. Light Steel: Sheet-metal screws. Do not penetrate outer skin of building from within.
7. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof-test load.

3.4 IDENTIFICATION MATERIALS AND DEVICES

A. Install at locations for most convenient viewing without interference with operation and maintenance of equipment.

B. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated in the Contract Documents or required by codes and standards. Use consistent designations throughout project.

C. Self-Adhesive Identification Products: Clean surfaces before applying.

D. Color-code 208/120-V system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:

1. Phase A: Black.
2. Phase B: Red.
3. Phase C: Blue.

E. Color-code 480/277-V system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:

1. Phase A: Brown.
2. Phase B: Orange.
3. Phase C: Yellow.

F. Install warning, caution, and instruction signs where required to comply with 29 CFR, Chapter XVII, Part 1910.145, and where needed to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.

G. Install engraved-laminated signs with white letters on black background with minimum 3/8 inch (9 mm) high lettering for equipment designations for switchgear or description of load being fed or controlled in the case of disconnects or contactors.

3.5 FIRESTOPPING

A. Apply firestopping to cable and raceway penetrations of fire-rated floor and wall assemblies to achieve fire-resistance rating of the assembly. Firestopping materials shall be fire resistant per ASTM E119 fire test conditions and shall be non-combustible when tested per ASTM E136. Melting point shall exceed 2000 degrees F. per ASTM C24. Fireproofing installation for openings in rated floors or partitions shall provide an airtight seal.

3.6 EQUIPMENT AND CONTROL WIRING

A. Wire in and connect every motor and item of equipment furnished as a part of this contract, including those furnished under other Divisions. Provide all required disconnecting means, boxes, conduit, conductors, etc. Motors and equipment furnished under other Divisions will be installed under that Division.

B. Motor starters and variable speed drives will be furnished under the division that the motors being controlled are furnished, and will be installed under Division 16 by the Electrical Contractor unless controllers are integral to the equipment. Installation includes mounting, connection to power and grounding.

C. Control Wiring: All control wiring and interlock wiring is included in Division 15.

3.7 DEMOLITION

A. Protect existing electrical equipment and installations not indicated to be removed. If damaged or disturbed in the course of the Work, remove damaged portions and install new products of equal capacity, quality, appearance and functionality.

B. Accessible Work: Remove exposed electrical equipment and installations, indicated to be demolished, in their entirety.

C. Abandoned Work: Cut and remove buried raceway and wiring, indicated to be abandoned in place, 2 inches (50 mm) below the surface of adjacent construction. Cap raceways and patch surface to match existing finish.

D. Existing Work to Remain: Maintain feed, or provide new feed to equipment and devices that are not being removed.

E. Remove demolished material from project site.

F. Remove, store, clean, reinstall, reconnect, and make operational components indicated for relocation.

3.8 SEQUENCING AND SCHEDULING

A. Electrical power and system interruptions shall be held to a minimum and will be permitted only at times approved by the Owner. The Owner may require that any interruptions be during nights, weekends, holidays, etc. Provide any required overtime work at no additional cost to Owner.

B. Do not interrupt feed to any service, feeder or branch circuit feeding facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to make temporary provisions where required according to requirements indicated:

1. Notify Owner no fewer than seven (7) days in advance of proposed interruption of electrical service.
2. Do not proceed with interruption of electrical service without Owner's written permission.
3. Provide all temporary facilities and services, including fire watch, required to maintain operation, security, and life safety.

3.9 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.

B. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing firestopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

3.10 FIELD QUALITY CONTROL

A. Inspect installed components for damage and faulty work, including the following:

1. Supporting devices for electrical components.
2. Electrical identification.
3. Electrical demolition.
4. Cutting and patching for electrical construction.
5. Touchup painting.

3.11 REFINISHING AND TOUCHUP PAINTING

A. Refinish and touch up paint:

1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.
2. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.
3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
4. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.12 CLEANING AND PROTECTION

A. Upon completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.

B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

END OF SECTION 16050

SECTION 16060 - GROUNDING AND BONDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes grounding of electrical systems and equipment. Grounding requirements specified in this Section may be supplemented by special requirements of systems described in other Sections.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70 (2011), Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1. Comply with UL 467.

PART 2 - PRODUCTS

2.1 MAUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Grounding Conductors, Cables, Connections, and Rods:

a. Ideal Industries, Inc.
b. ILSCO
c. Kearney/Cooper Power Systems
d. O-Z/Gedney Co.; a business of the EGS Electrical Group
e. Raco, Inc.; Division of Hubbell
f. Thomas and Betts, Electrical

2.2 GROUNDING CONDUCTORS

A. For insulated conductors, comply with Division 16 Section 16120, "Conductors and Cables."

B. Material: Copper.

C. Equipment Grounding Conductors: Insulated with green-colored insulation.

D. Isolated Ground Conductors: Insulated with green-colored insulation with yellow stripe. On feeders with isolated ground, use colored tape, alternating bands of green and yellow tape to provide a minimum of three bands of green and two bands of yellow.

E. Bare Copper Conductors: Comply with the following:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B8.

2.3 CONNECTOR PRODUCTS

A. Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.

B. Bolted Connectors: Bolted-pressure-type connectors, or compression type.

C. Twist-on Connectors: Plastic body with coiled copper alloy wire forming threads.

PART 3 - EXECUTION

3.1 APPLICATION

A. Use only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone, and similar materials.

B. In raceways, use insulated equipment grounding conductors.

C. Equipment Grounding Conductor Terminations: Use bolted clamp type or compression connectors for conductors larger than 10 AWG. Use Plastic body twist-on connectors for 10AWG and smaller.

3.2 EQUIPMENT GROUNDING CONDUCTORS

A. Comply with NFPA 70, Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated.

B. Install equipment grounding conductors in all feeders and circuits.

3.3 CONNECTIONS

A. General: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.
2. Make connections with clean, bare metal at points of contact.
3. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

B. Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.

C. Noncontact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically noncontinuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.

D. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

E. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.

END OF SECTION 16060

SECTION 16120 - CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Field Quality-Control Test Reports: From Contractor.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70 (2011).

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Manufacturers:

1. American Insulated Wire Corp.; a Leviton Company.
2. General Cable Corporation.
3. Senator Wire & Cable Company.
4. Southwire Company.

B. Refer to Part 3 "Conductor and Insulation Applications" Article for insulation type, cable construction, and ratings.

C. Conductor Material: Copper complying with NEMA WC 5 or 7; stranded or solid conductor for No. 10 AWG and smaller, stranded for No. 8 AWG and larger.

D. Conductor Insulation Types: Type THHN-THWN or XHHW complying with NEMA WC 5 or 7 as applicable.

2.2 CONNECTORS AND SPLICES

A. Manufacturers:

1. AFC Cable Systems, Inc.
2. AMP Incorporated/Tyco International.
3. Hubbell/Anderson.
4. O-Z/Gedney; EGS Electrical Group LLC.
5. 3M Company; Electrical Products Division.
6. Ideal

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated. Push in splice and insulation displacement type connectors shall not be used.

PART 3 - EXECUTION

3.1 CONDUCTOR AND INSULATION APPLICATIONS

A. Feeders and Branch Circuits: Type THHN-THWN or XHHW single conductors in raceway. Minimum size #12 AWG or larger where required for voltage drop. Where branch circuits exceed 100 feet in length, use minimum #10 AWG. Wire size in raceways containing multiple neutrals shall be minimum #10 AWG.

B. Fire Alarm Circuits: Type THHN-THWN, in raceway or Power-limited, fire-protective, signaling circuit cable in raceways. Size as recommended by equipment manufacturer or as specified in fire alarm specifications.

C. Class 1 Control Circuits: Type THHN-THWN, in raceway. Minimum size #14 AWG.

D. Class 2 Control Circuits: Type THHN-THWN, in raceway or Power-limited cable in raceways. Size as recommended by equipment manufacturer.

3.2 INSTALLATION

A. Run all conductors and cables in raceways unless specifically indicated otherwise. Where cables are specifically indicated to be run open, use plenum type.

B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

D. Identify and color-code conductors and cables according to Division 16 Section 16050, "Basic Electrical Materials and Methods."

E. No more than three current carrying phase conductors (excluding switch legs and grounded conductors), and one grounding conductor, may be installed in any raceway.

F. Provide a separate grounded conductor (neutral) for each 120 volt branch circuit; do not use common neutrals.

3.3 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150 mm) of slack.

3.4 FIELD QUALITY CONTROL

A. Testing: Perform the following field quality-control testing:

1. After installing conductors and cables and before electrical circuitry has been energized, test for compliance with requirements.
2. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.3.1. Certify compliance with test parameters.

B. Test Reports: Prepare a written report to record the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

END OF SECTION 16120

SECTION 16130 - RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

B. Related Sections include the following:

1. Division 16 Section 16050, "Basic Electrical Materials and Methods," for supports, anchors, and identification products.
2. Division 16 Section 16140, "Wiring Devices," for devices installed in boxes.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. FMC: Flexible metal conduit.

C. IMC: Intermediate metal conduit.

D. LFMC: Liquidtight flexible metal conduit.

E. RNC: Rigid nonmetallic conduit.

F. Fixture Whip: Flexible wiring as specified from box to individual lighting fixture.

1.4 SUBMITTALS

A. Product Data: For raceways, fittings, and enclosures, and cabinets.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70 (2011).

1.6 COORDINATION

A. Coordinate layout and installation of raceways, boxes, enclosures, cabinets, and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING AND RACEWAY SYSTEMS

A. Manufacturers:

1. Anamet Electrical, Inc.; Anaconda Metal Hose.
2. Electri-Flex Co.
3. Grinnell Co./Tyco International; Allied Tube and Conduit Div.
4. LTV Steel Tubular Products Company.
5. Manhattan/CDT/Cole-Flex.
6. O-Z Gedney; Unit of General Signal.
7. Wheatland Tube Co.

B. Rigid Steel Conduit: ANSI C80.1. U. L. 6. Threaded with threaded fittings.

C. IMC: ANSI C80.6. U.L. 1242.

D. EMT and Fittings: ANSI C80.3. U.L. 797.

1. Fittings, 2 Inch Diameter and Larger: Steel (not die cast) set-screw or compression type.
2. Fittings, Smaller than 2 Inches Diameter: Compression type.

E. FMC: Zinc-coated steel.

F. LFMC: Flexible steel conduit with PVC jacket.

G. Fittings: NEMA FB 1; compatible with conduit and tubing materials.

2.2 NONMETALLIC CONDUIT AND TUBING

A. Manufacturers:

1. American International.
2. Anamet Electrical, Inc.; Anaconda Metal Hose.
3. Arnco Corp.
4. Cantex Inc.
5. Certainteed Corp.; Pipe & Plastics Group.
6. Condux International.
7. ElecSYS, Inc.
8. Lamson & Sessions; Carlon Electrical Products.
9. Manhattan/CDT/Cole-Flex.

10. RACO; Division of Hubbell, Inc.
11. Thomas & Betts Corporation.

B. RNC: NEMA TC 2, Schedule 40 and Schedule 80 PVC.

C. RNC Fittings: NEMA TC 3; match to conduit or tubing type and material.

2.3 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers:

1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
2. Emerson/General Signal; Appleton Electric Company.
3. Erickson Electrical Equipment Co.
4. Hoffman.
5. Hubbell, Inc.; Killark Electric Manufacturing Co.
6. O-Z/Gedney; Unit of General Signal.
7. RACO; Division of Hubbell, Inc.
8. Robroy Industries, Inc.; Enclosure Division.
9. Scott Fetzer Co.; Adalet-PLM Division.
10. Spring City Electrical Manufacturing Co.
11. Thomas & Betts Corporation.
12. Walker Systems, Inc.; Wiremold Company (The).
13. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary.

B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.

C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, Type FD, with gasketed cover.

D. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

2.4 FACTORY FINISHES

A. Finish: For raceway, enclosure, or cabinet components, provide manufacturer's standard paint applied to factory-assembled surface raceways, enclosures, and cabinets before shipping.

B. Finish: For raceway, enclosure, or cabinet components, provide manufacturer's standard prime-coat finish ready for field painting.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Use the following raceways for outdoor installations:

1. Exposed: Rigid steel conduit.
2. Concealed: Rigid steel conduit.
3. Underground, Single Run: RNC.

4. Underground, Grouped: RNC.
5. Connection to Vibrating Equipment: LFMC.
6. Boxes and Enclosures: NEMA 250, Type 3R or Type 4.

B. Use the following raceways for indoor installations:

1. Exposed in Unfinished Areas: EMT. Use IMC or Rigid Steel Conduit for locations subject to mechanical damage.
2. Exposed in finished areas: Not allowed.
3. Concealed: EMT.
4. Connection to Vibrating Equipment: FMC; except in wet or damp locations, use LFMC.
5. Damp or Wet Locations: IMC.
6. Boxes and Enclosures: NEMA 250, Type 1, unless otherwise indicated.

C. Minimum Raceway Size: 3/4-inch trade size (DN 21) unless noted.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings approved for use with that material. Patch all nicks and scrapes in PVC coating after installing conduits.

3.2 INSTALLATION

A. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water piping.

B. Do not support electrical equipment or raceways from ceiling grid or ceiling grid supports. Independently support all equipment and raceways directly from structural elements.

C. Complete raceway installation before starting conductor installation.

D. Support raceways as specified in Division 16 Section 16050, "Basic Electrical Materials and Methods."

E. Install temporary closures to prevent foreign matter from entering raceways.

F. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portions of bends are not visible above the finished slab.

G. Make bends and offsets so ID is not reduced. Keep legs of bends in the same plane and keep straight legs of offsets parallel, unless otherwise indicated.

H. Conceal raceways within finished walls, ceilings, and floors unless concealment is impossible or where otherwise indicated.

1. Install concealed raceways with a minimum of bends in the shortest practical distance, considering type of building construction and obstructions, unless otherwise indicated.

I. Install exposed raceways parallel or at right angles to nearby surfaces or structural members and follow surface contours as much as possible.

1. Run parallel or banked raceways together on common supports.
2. Make parallel bends in parallel or banked runs. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.

J. Join raceways with fittings designed and approved for that purpose and make joints tight.

1. Use insulating bushings to protect conductors.

K. Tighten set screws of threadless fittings with suitable tools.

L. Terminations:

1. Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against box. Use two locknuts, one inside and one outside box.
2. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used, align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.

M. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200 lb (90 kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire.

N. Flexible Connections: Use maximum of 12 inches (35 mm) of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for all motors. Use LFMC in damp or wet locations. Install separate ground conductor across flexible connections.

3.3 PROTECTION

A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.4 CLEANING

A. After completing installation of exposed, factory-finished raceways and boxes, inspect exposed finishes and repair damaged finishes.

END OF SECTION 16130

SECTION 16140 - WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes ground-fault circuit interrupters.

1.3 DEFINITIONS

A. GFCI: Ground-fault circuit interrupter.

B. TVSS: Transient voltage surge suppressor.

C. EMI: Electromagnetic interference.

D. UTP: Unshielded twisted pair.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of wiring device through one source from a single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NFPA 70 (2011).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide products of one of the following (for each type of wiring device):

1. GFCI Receptacles, 125V-1ϕ-20A:

    a. Hubbell #HBL-GF-5362.
    b. Leviton #8899.
    c. P & S #2091-S.

2. Motor Rated Switches and Manual Motor Starters:

    a. General Electric CR101 Series.
    b. Square-D FG or KG Series.
    c. P & S 78XX Series.

2.2 DEVICE PLATES

A. Single and combination types to match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: 0.035 inch (1 mm) thick, satin-finished stainless steel. Material for Unfinished Spaces: Galvanized steel.
3. Material for Wet Locations: Thermoplastic, with spring-loaded lift cover, and listed and labeled for use in "wet locations." For receptacles, listing shall apply with plug cap inserted.

2.3 FINISHES

A. Color:

1. Wiring Devices Connected to Normal Power System: Gray, unless otherwise indicated or required by NFPA 70.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install devices and assemblies level, plumb, and square with building lines.

3.2 IDENTIFICATION

A. Comply with Division 16 Section 16050, "Basic Electrical Materials and Methods".

1. Receptacles: Identify panelboard and circuit number from which served. Use hot, stamped or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.3 CONNECTIONS

A. Ground equipment according to Division 16 Section 16060, "Grounding and Bonding."

B. Connect wiring according to Division 16 Section 16120, "Conductors and Cables."

C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

D. Do not connect stranded wire to devices using back wired push-in feature.

E. When terminating stranded conductors on devices, ends of strands shall be contained by insulation so that all strands must be held by screw.

3.4 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:

1. After installing wiring devices and after electrical circuitry has been energized, test for proper polarity, ground continuity, and compliance with requirements.
2. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.

B. Remove malfunctioning units, replace with new units, and retest as specified above.

END OF SECTION 16140

SECTION 16288 – SURGE PROTECTIVE DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes service entrance surge protective device and surge protective device at exterior HVAC equipment containing hermetic compressors.

1.3 DEFINITIONS

A. ATS: Acceptance Testing Specifications.

B. SVR: Suppressed voltage rating.

C. TVSS: Transient voltage surge suppressor.

D. SPD: Surge Protective Devices (SPD's).

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating weights, operating characteristics, furnished specialties, and accessories.

B. Product Certificates: For SPD's, signed by product manufacturer certifying compliance with the following standards:

1. UL 1283.
2. UL 1449.

C. Operation and Maintenance Data: For SPD's to include in emergency, operation, and maintenance manuals.

D. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain SPD's and accessories through one source from a single manufacturer.

B. Product Options: Drawings indicate size, dimensional requirements, and electrical performance of SPD's and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Comply with NEMA LS 1, "Low Voltage Surge Protection Devices."

E. Comply with NFPA 70 (2011).

1.6 PROJECT CONDITIONS

A. Service Conditions: Rate surge protection devices for continuous operation under the following conditions, unless otherwise indicated:

1. Maximum Continuous Operating Voltage: Not less than 115 percent of nominal system operating voltage.
2. Operating Temperature: 30 to 120 degrees F (0 to 50 degrees C).
3. Humidity: 0 to 85 percent, noncondensing.
4. Altitude: Less than 20,000 feet (6090 meters) above sea level.

1.7 COORDINATION

A. Coordinate location of SPD's to allow adequate clearances for maintenance.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of surge suppressors that fail in materials or workmanship within one year from date of Final Inspection.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the specified.

2.2 SURGE PROTECTIVE DEVICES

A. Surge Protection Device Description: Non-modular, sine-wave-tracking type with the following features and accessories:

1. LED indicator lights for power and protection status.

2. Knockout mounted.

B. Peak Single-Impulse Surge Current Rating: 20 kA per phase.

C. Connection Means: Permanently wired.

D. Manufacturers:

1. 120/208V, three phase

a. Cutler Hammer 2-CHSA01
b. General Electric 2-9L15FCB001
c. Joslyn 1455-21
d. Square-D 2-SDSA1175

2. 277/480V, three phase

a. Cutler Hammer CHSA03
b. General Electric 9L15ECC001
c. Joslyn 1456-21
d. Square-D SDSA3650

PART 3 - EXECUTION

3.1 INSTALLATION OF SURGE PROTECTION DEVICES

A. Install devices at each exterior item of mechanical equipment having a hermetic compressor. Connect on line side of local disconnect, with ground lead bonded to branch circuit ground.

B. Make arrester leads as short as possible and keep radius of bends in wire as large as is practical.

3.2 PLACING SYSTEM INTO SERVICE

A. Do not energize or connect service entrance or HVAC equipment to their sources until SPD's are installed and connected.

3.3 FIELD QUALITY CONTROL

A. Testing: Perform the following field tests and inspections and prepare test reports:

1. After installing surge protection devices, but before electrical circuitry has been energized, test for compliance with requirements.
2. Complete startup checks according to manufacturer's written instructions.
3. Perform each visual and mechanical inspection and electrical test stated in NETA ATS, "Surge Arresters, Low-Voltage Surge Protection Devices" Section. Certify compliance with test parameters.

B. Remove and replace malfunctioning units and retest as specified above.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to maintain SPD’s. Refer to Division 1.

END OF SECTION 16288

SECTION 16410 - ENCLOSED SWITCHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes individually mounted enclosed switches used for motor and equipment disconnecting means.

B. Related Sections include Division 16 Section 16491, "Fuses," for overcurrent protective devices installed in switches.

1.3 DEFINITIONS

A. SPDT: Single pole, double throw.

1.4 SUBMITTALS

A. Product Data: For each type of switch, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Field Test Reports: Submit written test reports and include the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

C. Maintenance Data: For enclosed switches and for components to include in maintenance manuals specified in Division 1. In addition to requirements specified in Division 1 Section "Closeout Procedures," include the following:

1. Routine maintenance requirements for components.
2. Manufacturer's written instructions for testing and adjusting switches.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NEMA AB 1 and NEMA KS 1.

C. Comply with NFPA 70 (2011).

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:

1. Ambient Temperature: Not less than minus 22 degrees F (minus 30 degrees C) and not exceeding 104 degrees F (40 degrees C).
2. Altitude: Not exceeding 6600 feet (2000 meters).

1.7 COORDINATION

A. Coordinate layout and installation of switches and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Fusible Switches:

a. Eaton Corp.; Cutler-Hammer Products. DH Series
b. General Electric Co.; Electrical Distribution & Control Division. Type "TH"
c. Siemens Energy & Automation, Inc. "H" Series
d. Square D Co. "H" Series

2.2 ENCLOSED SWITCHES

A. Enclosed, Nonfusible Switch: NEMA KS 1, Type HD, with lockable handle.

B. Enclosed, Fusible Switch, 800 A and Smaller: NEMA KS 1, Type HD, with clips to accommodate specified fuses, lockable handle with two padlocks, and interlocked with cover in closed position.

2.3 ENCLOSURES

A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.

1. Outdoor Locations: NEMA 250, Type 3R.

2. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
3. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

2.4 FACTORY FINISHES

A. Finish: Manufacturer's standard paint applied to factory-assembled and -tested enclosures before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches for compliance with installation tolerances and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

B. Switches shall be mounted so that operating handle is up when switch is on and down when it is off.

3.3 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 16 Section 16050, "Basic Electrical Materials and Methods."

B. Enclosure Nameplates: Label each enclosure with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws. Indicate load designation.

3.4 CONNECTIONS

A. Install equipment grounding connections for switches with ground continuity to main electrical ground bus.

B. Connect lightning arresters.

C. Install power wiring. Install wiring between switches and equipment.

D. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.5 FIELD QUALITY CONTROL

A. Prepare for acceptance tests as follows:

1. Test insulation resistance for each enclosed switch and component.
2. Test continuity of each line- and load-side circuit.

B. Testing: After installing enclosed switches and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

1. Procedures: Perform each visual and mechanical inspection and electrical test indicated in NETA ATS, Section 7.5. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

3.6 CLEANING

A. Upon completion of installation, inspect interior and exterior of enclosures. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION 16410

SECTION 16442 - PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section lighting and appliance branch-circuit panelboards.

1.3 DEFINITIONS

A. GFCI: Ground-fault circuit interrupter.

1.4 SUBMITTALS

A. Product Data: For each type of panelboard, overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

1. Dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings. Include the following:

a. Enclosure types and details for types other than NEMA 250, Type 1.
b. Bus configuration, current, and voltage ratings.
c. Short-circuit current rating of panelboards and overcurrent protective devices.
d. UL listing for series rating of installed devices.
e. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

2. Wiring Diagrams: Power, signal, and control wiring.

C. Field quality-control test reports including the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

D. Panelboard Schedules: For installation in panelboards.

E. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1, include the following:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
2. Time-current curves, including selectable ranges for each type of overcurrent protective device.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories through one source from a single manufacturer.

B. Product Options: Drawings indicate size, profiles, and dimensional requirements of panelboards and are based on the specific system indicated. Refer to Division 1 Section "Material and Equipment."

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Comply with NEMA PB 1.

E. Comply with NFPA 70 (2011).

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:

1. Ambient Temperature: Not exceeding 104 degrees F (40 degrees C).
2. Altitude: Not exceeding 6600 feet (2000 meters).

B. Service Conditions: NEMA PB 1, usual service conditions, as follows:

1. Ambient temperatures within limits specified.
2. Altitude not exceeding 6600 feet (2000 meters).

C. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

1. Notify Owner no fewer than seven days in advance of proposed interruption of electrical service.
2. Do not proceed with interruption of electrical service without Owner's written permission.

1.7 COORDINATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, and encumbrances to workspace clearance requirements.

B. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3.

1.8 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Keys: Six spares for each type of panelboard cabinet lock.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Enclosures: Surface-mounted cabinets as indicated. NEMA PB 1, Type 1.

1. Rated for environmental conditions at installed location.

    a. Outdoor Locations: NEMA 250, Type 3R.
    b. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
    c. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
3. Finish: Manufacturer's standard enamel finish over corrosion-resistant treatment or primer coat.
4. Directory Card: With transparent protective cover, mounted in metal frame, inside panelboard door.

B. Phase and Ground Buses:

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors; bonded to box.

C. Conductor Connectors: Suitable for use with conductor material.

1. Main and Neutral Lugs: Mechanical type.
2. Ground Lugs and Bus Configured Terminators: Mechanical type.
3. Feed-Through Lugs: Mechanical type suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.

D. Future Devices: Mounting brackets, bus connections, and necessary appurtenances required for future installation of devices.

2.2 PANELBOARD SHORT-CIRCUIT RATING

A. Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.3 OVERCURRENT PROTECTIVE DEVICES

A. Molded-Case Circuit Breaker: UL 489, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Full module, inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Tandem or "piggyback" breakers are not acceptable.
2. Coordinate trips to match installed HVAC equipment manufacturer's recommendations.

B. Molded-Case Circuit-Breaker Features and Accessories: Standard frame sizes, trip ratings, and number of poles.

1. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
2. Application Listing: Appropriate for application; Type HACR for heating, air-conditioning, and refrigerating equipment.
3. Multipole units enclosed in a single housing or factory-assembled to operate as a single unit.

2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Manufacturers: Products: Subject to compliance with requirements, provide one of the products specified.

1. Cutler-Hammer: PRL2a (277/480V).
2. General Electric: AE Series(277/480V).
3. Siemens: Sentron S2 (277/480V).
4. Square-D: NF(277/480V).

B. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

C. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install panelboards and accessories according to NEMA PB 1.1.

B. Mount top of trim 74 inches (1880 mm) above finished floor, unless otherwise indicated.

C. Install overcurrent protective devices and controllers.

D. Install filler plates in unused spaces.

E. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.

3.2 IDENTIFICATION

A. Create a directory to indicate installed circuit loads after balancing panelboard loads. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

B. Panelboard Nameplates: Label each panelboard with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.

3.3 CONNECTIONS

A. Ground equipment according to Division 16 Section 16060, "Grounding and Bonding."

B. Connect wiring according to Division 16 Section 16120, "Conductors and Cables."

3.4 FIELD QUALITY CONTROL

A. Prepare for acceptance tests as follows:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

B. Perform the following field tests and inspections and prepare test reports:

1. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

C. Record Drawings: Indicate actual circuit designations on Record Drawings.

3.5 CLEANING

A. Upon completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION 16442

SECTION 16491 - FUSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes cartridge fuses rated 600 V and less for use in switches.

1.3 SUBMITTALS

A. Product Data: Include the following for each fuse type indicated:

1. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
2. Let-through current curves for fuses with current-limiting characteristics.
3. Time-current curves, coordination charts and tables, and related data.
4. Fuse size for elevator feeders and elevator disconnect switches.

B. Ambient Temperature Adjustment Information: If ratings of fuses have been adjusted to accommodate ambient temperatures, provide list of fuses with adjusted ratings.

1. For each fuse having adjusted ratings, include location of fuse, original fuse rating, local ambient temperature, and adjusted fuse rating.
2. Provide manufacturer's technical data on which ambient temperature adjustment calculations are based.

C. Operation and Maintenance Data: For fuses to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Division 1, include the following:

a. Let-through current curves for fuses with current-limiting characteristics.
b. Time-current curves, coordination charts and tables, and related data.
c. Ambient temperature adjustment information.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain fuses from a single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NEMA FU 1.

D. Comply with NFPA 70 (2011).

1.5 PROJECT CONDITIONS

A. Where ambient temperature to which fuses are directly exposed is less than 40 degrees F (5 degrees C) or more than 100 degrees F (38 degrees C), apply manufacturer's ambient temperature adjustment factors to fuse ratings.

1.6 COORDINATION

A. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: Quantity equal to one complete set of each type and size.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cooper Bussman, Inc.
2. Ferraz Shawmut, Inc.
3. Tracor, Inc.; Littelfuse, Inc. Subsidiary.

2.2 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, nonrenewable cartridge fuse; class and current rating indicated; voltage rating consistent with circuit voltage.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.

B. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FUSE APPLICATIONS

A. Motor Branch Circuits: Dual element, time delay, current limiting, Class RK5.

3.3 INSTALLATION

A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

3.4 IDENTIFICATION

A. Install labels indicating fuse replacement information on inside door of each fused switch.

END OF SECTION 16491

SECTION 16721 - FIRE ALARM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes fire alarm systems.

1.3 DEFINITIONS

A. FACP: Fire alarm control panel.

B. LED: Light-emitting diode.

C. NICET: National Institute for Certification in Engineering Technologies.

D. Definitions in NFPA 72 apply to fire alarm terms used in this Section.

1.4 SYSTEM DESCRIPTION

A. Noncoded, addressable system; multiplexed signal transmission dedicated to fire alarm service only.

1. Interface with existing fire alarm system.

1.5 QUALITY ASSURANCE

A. Codes: The equipment and installation shall comply with the current provisions of the following codes and standards:

1. National Electric Code (2008).
2. National Fire Alarm Code - NFPA 72 (2010) and all recommendations of Appendix "A."
3. NFPA 13 (2002)
4. Life Safety Code - NFPA 101 (2009).
5. Local and State Building Codes.
6. Americans with Disabilities Act Architectural Guidelines (ADAAG).
7. Applicable portions of the Louisiana State Fire Marshal's Act, Parts 1 and 2.
8. Current requirements of the Louisiana Fire Marshal's Office, Plan Review Section as outlined in http://www.dps.state.la.us/sfm/.

9. All system components shall be listed by Underwriters Laboratories Inc. for use in fire protective signaling system under the following standards as applicable:

    a. UL 268: Smoke Detectors for Fire Protective Signaling Systems.
    b. UL 521: Heat Detectors for Fire Protective Signaling Systems.
    c. UL1481: Power Supplies for Fire Protective Signaling Systems.
    d. UL 864: Control Units for Fire Protective Signaling Systems.

B. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70 (2011), Article100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.6 PERFORMANCE REQUIREMENTS

A. Fire alarm signal initiation to the existing FACP shall be by duct smoke detectors.

B. Fire alarm signal shall initiate the following actions:

1. Alarm notification appliances shall operate continuously.
2. Identify alarm at the FACP and remote annunciators.
3. Transmit an alarm signal to the remote alarm receiving station.
4. Record events in the system memory.
5. FACP shall shutdown HVAC equipment upon initiation of associated smoke detectors.

C. System trouble signal initiation as it applies to this project shall be by one or more of the following devices or actions:

1. Open circuits, shorts and grounds of wiring for initiating device, signaling line, and notification-appliance circuits.

D. System Trouble and Supervisory Signal Actions: Ring trouble bell and annunciate at the FACP and remote annunciators.

1.7 SUBMITTALS

A. Provide one copy of all of the below listed documentation, in excess of the number of copies required in Division 1, for review by the Authority Having Jurisdiction.

B. Product Data: For each item of equipment indicated and required, provide roughing-in diagrams and instructions for installation, operation, and maintenance suitable for inclusion in maintenance manuals. Include typical wiring diagrams for each item of fire alarm equipment being supplied. Include U. L. listings and all other information required by the Authority Having Jurisdiction.

C. Shop Drawings: Provide shop drawings showing equipment/device locations and connecting wiring of entire fire alarm and detection system, on floor plans. Include wiring and riser diagrams. Information pertaining to interface with existing facilities, and all existing facilities being reused, shall be indicated. Provide all documentation required for review, by Authority Having Jurisdiction, to allow review by Engineer prior to submission. Provide additional information needed for review, by Authority Having Jurisdiction, to determine how the complete system operates as a whole. No work, including rough-in, shall be started without review by the Engineer and the Authority Having Jurisdiction, and without acceptance by both.

1. Shop Drawings shall be prepared by persons with the following qualifications:

    a. Trained and certified by manufacturer in fire alarm system design.
    b. Fire alarm certified by NICET, minimum Level 3.

2. System Operation Description: Detailed description for this Project, including method of operation and supervision of each type of circuit and sequence of operations for manually and automatically initiated system inputs and outputs. Manufacturer's standard descriptions for generic systems are not acceptable.
3. Device Address List: Coordinate with final system programming.
4. System riser diagram with device addresses, conduit sizes, and cable and wire types and sizes.
5. Wiring Diagrams: Power, signal, and control wiring. Include diagrams for equipment and for system with all terminals and interconnections identified. Show wiring color code.
6. Duct Smoke Detectors: Performance parameters and installation details for each detector, verifying that each detector is listed for the complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
7. Ductwork Coordination Drawings: Plans, sections, and elevations of ducts, drawn to scale and coordinating the installation of duct smoke detectors and access to them. Show critical dimensions that relate to placement and support of sampling tubes, the detector housing, and remote status and alarm indicators. Locate detectors according to manufacturer's written recommendations.
8. Floor Plans: Indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits.

D. Qualification Data: For Installer.

E. Field quality-control test reports.

F. Operation and Maintenance Data: For fire alarm system to include in emergency, operation, and maintenance manuals. Comply with NFPA 72, Appendix A, recommendations for Owner's manual. Include abbreviated operating instructions for mounting at the FACP.

G. Documentation:

1. Approval and Acceptance: Provide the "Record of Completion" form according to NFPA 72 to Owner.
2. Record of Completion Documents: Provide the "Permanent Records" according to NFPA 72 to Owner. Format of the written sequence of operation shall be the optional input/output matrix.

a. Hard copies on paper to Owner.
b. Electronic media may be provided to Owner.

H. Provide completed Review Request Form and check for payment of review fee, all as required by The Office of the State Fire Marshal.

1.8 QUALITY ASSURANCE

A. Installer:

1. An electrician or NICET Level 1 (or higher) Fire Alarm Technician shall install conduit for the fire alarm system.
2. An electrician or NICET Level 1 (or higher) Fire Alarm Technician shall be allowed to install wire or cable.
3. An electrician or NICET Level 1or higher Fire Alarm Technician shall be allowed to install and terminate fire alarm devices.
4. A NICET Level 3 (or higher) Fire Alarm Technician shall supervise the installation of the fire alarm system and shall terminate cabling in cabinets and panels.
5. A NICET Level 3 (or higher) Fire Alarm Technician shall program addressable systems and shall perform all specified tests and inspection; and shall prepare all specified reports.

B. Installer Qualifications: Where a NICET level Fire Alarm Technician is required to perform installation tasks, personnel shall be trained and certified by manufacturer for installation of units required for this Project.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.9 PROJECT CONDITIONS

A. Interruption of Existing Fire Alarm Service: Do not interrupt fire alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:

1. Notify Owner no fewer than seven days in advance of proposed interruption of fire alarm service.
2. Do not proceed with interruption of fire alarm service without Owner's written permission.

1.10 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Smoke, Fire, and Flame Detectors: Quantity equal to 10 percent of amount of each type installed, but not less than 1 unit of each type.

2. Detector Bases: Quantity equal to 2 percent of amount of each type installed, but not less than 1 unit of each type.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the same manufacturer as that of existing system.

2.2 EXISTING FIRE ALARM SYSTEM

A. Compatibility with Existing Equipment: Fire alarm system and components shall operate as an extension of the existing system.

2.3 SYSTEM SMOKE DETECTORS

A. General Description:

1. UL 268 listed, operating at 24-V dc, nominal.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.
3. Plug-in Arrangement: Detector and associated electronic components shall be mounted in a plug-in module that connects to a fixed base. Provide terminals in the fixed base for connection of building wiring.
4. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
5. Integral Visual-Indicating Light: LED type. Indicating detector has operated and power-on status. Include remote indicator for all concealed smoke detectors.
6. Remote Control: Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at the FACP for calibration, sensitivity, and alarm condition, and individually adjustable for sensitivity from the FACP.

B. Duct Smoke Detectors:

1. Photoelectric Smoke Detectors:

    a. Sensor: LED or infrared light source with matching silicon-cell receiver.
    b. Detector Sensitivity: Between 2.5 and 3.5 percent/foot (0.008 and 0.011 percent/mm) smoke obscuration when tested according to UL 268A.

2. UL 268A listed, operating at 24-V dc, nominal.
3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.
4. Plug-in Arrangement: Detector and associated electronic components shall be mounted in a plug-in module that connects to a fixed base. The fixed base shall be designed for mounting directly to the air duct. Provide terminals in the fixed base for connection to building wiring.

a. Weatherproof Duct Housing Enclosure: UL listed for use with the supplied detector. The enclosure shall comply with NEMA 250 requirements for Type 4X.

5. Self-Restoring: Detectors shall not require resetting or readjustment after actuation to restore them to normal operation.
6. Integral Visual-Indicating Light: LED type. Indicating detector has operated and power-on status. Provide remote status and alarm indicator and test station where detector is concealed.
7. Remote Control: Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at the FACP for calibration, sensitivity, and alarm condition, and individually adjustable for sensitivity from the FACP.
8. Each sensor shall have multiple levels of detection sensitivity.
9. Sampling Tubes: Design and dimensions as recommended by manufacturer for the specific duct size, air velocity, and installation conditions where applied.
10. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.

2.4 WIRE AND CABLE

A. Wire and cable for fire alarm systems shall be UL listed and labeled as complying with NFPA 70, Article 760.

B. Signaling Line Circuits: Twisted, shielded pair, size as recommended by system manufacturer.

1. Circuit Integrity Cable: Twisted shielded pair, NFPA 70 Article 760, Classification CI, for power-limited fire alarm signal service. UL listed as Type FPL, and complying with requirements in UL 1424 and in UL 2196 for a 2-hour rating.

C. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 degrees C, color-coded insulation.

1. Low-Voltage Circuits: No. 16 AWG, minimum.
2. Line-Voltage Circuits: No. 12 AWG, minimum.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

A. Connecting to Existing Equipment: Verify that existing fire alarm system is operational before making changes or connections.

1. Connect new equipment to the existing control panel in the existing part of the building.
2. Connect new equipment to the existing monitoring equipment at the Supervising Station.
3. Expand, modify, and supplement the existing monitoring equipment as necessary to extend the existing monitoring functions to the new points. New components shall be capable of merging with the existing configuration without degrading the performance of either system.

B. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of the duct.

3.2 WIRING INSTALLATION

A. Install wiring according to the following:

1. NECA 1.
2. TIA/EIA 568-A.

B. Wiring Method: Install wiring in metal raceway according to Division 16 Section 16130, "Raceways and Boxes."

1. Fire alarm circuits and equipment control wiring associated with the fire alarm system shall be installed in a dedicated raceway system. This system shall not be used for any other wire or cable.

C. Wiring Method:

1. Cables and raceways used for fire alarm circuits, and equipment control wiring associated with the fire alarm system, may not contain any other wire or cable.
2. Fire-Rated Cables: Use of 2-hour fire-rated fire alarm cables, NFPA 70 Types MI and CI, is not permitted as an option to a raceway system.
3. Signaling Line Circuits: Power-limited fire alarm cables may be installed in the same cable or raceway as signaling line circuits.

D. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

E. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.

F. Color-Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and a different color-code for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire alarm system junction boxes and covers red. Fire alarm system raceways shall be red or marked with red paint on minimum five foot centers; coordinate paint locations with conduit fittings so paint does not interfere with ground integrity of raceway system.

3.3 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals according to Division 16 Section 16050, “Basic Electrical Materials and Methods.”

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing and inspecting agency to perform the following field tests and inspections and prepare test reports:

B. Perform the following field tests and inspections and prepare test reports:

1. Before requesting final approval of the installation, submit a written statement using the form for Record of Completion shown in NFPA 72.
2. Perform each electrical test and visual and mechanical inspection listed in NFPA 72. Certify compliance with test parameters. All tests shall be conducted under the direct supervision of a NICET technician certified under the Fire Alarm Systems program at Level III.

    a. Include the existing system in tests and inspections.

3. Visual Inspection: Conduct a visual inspection before any testing. Use as-built drawings and system documentation for the inspection. Identify improperly located, damaged, or nonfunctional equipment, and correct before beginning tests.
4. Testing: Follow procedure and record results complying with requirements in NFPA 72.

    a. Detectors that are outside their marked sensitivity range shall be replaced.

5. Test and Inspection Records: Prepare according to NFPA 72, including demonstration of sequences of operation by using the matrix-style form in Appendix A in NFPA 70.

3.5 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions.

B. Follow-Up Tests and Inspections: After date of Substantial Completion, test the fire alarm system complying with testing and visual inspection requirements in NFPA 72.

END OF SECTION 16721

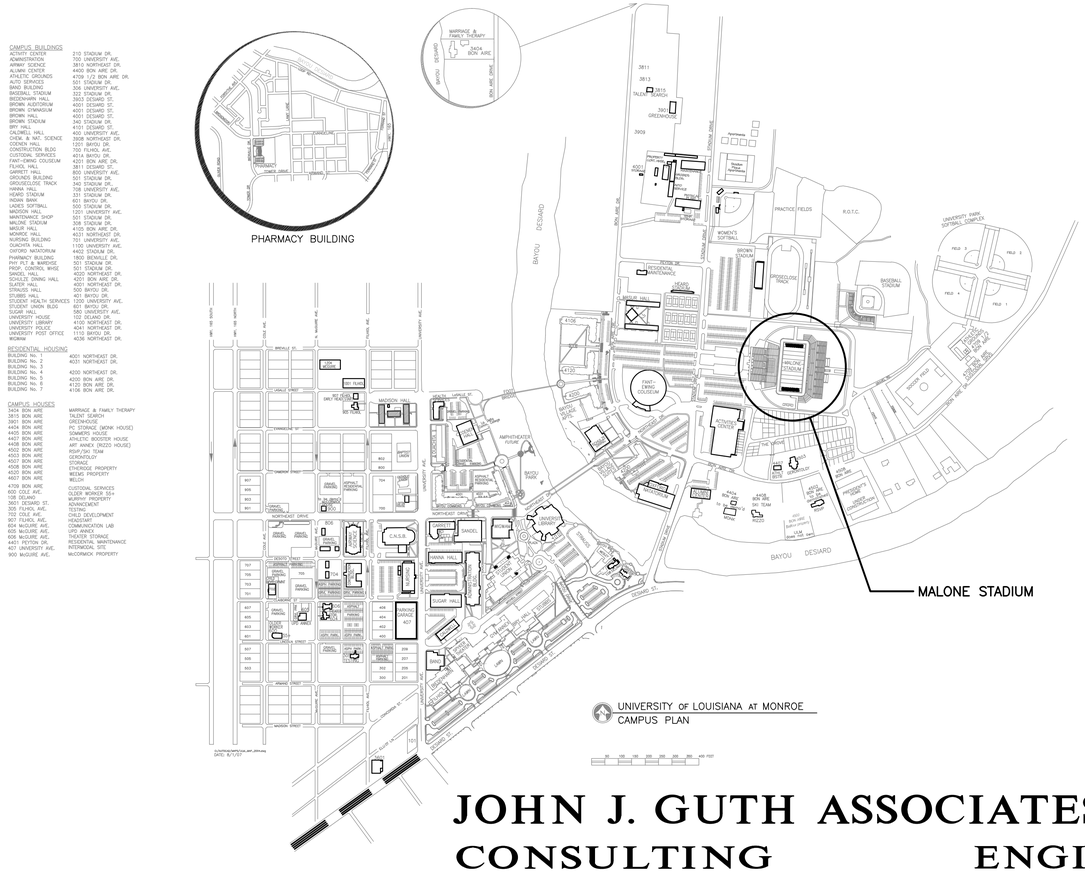
REPLACE PRESSBOX

AND SKYBOX HVAC

MALONE STADIUM

University of Louisiana at Monroe
Monroe, Louisiana

MARCH 14, 2013



INDEX TO DRAWINGS

STATE OF LOUISIANA
JOHN C. WILSON
REG. No. 19008
REGISTERED
PROFESSIONAL ENGINEER
IN
MECHANICAL ENGINEERING
3/14/2013

STATE OF LOUISIANA
JOHN P. NEWMAN
REG. No. 22378
REGISTERED
PROFESSIONAL ENGINEER
IN
ELECTRICAL ENGINEERING
3/14/2013

JOHN J. GUTH ASSOCIATES, INC.
CONSULTING ENGINEERS
SHREVEPORT, LOUISIANA

6339/CS1

DATE DRAWING LAST SAVED: 03/14/13 TIME:13:43:24
DATE DRAWING LAST PLOTTED: 03/14/13 TIME:13:43:25

ELECTRICAL SYMBOLS

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	FLUORESCENT LIGHTING FIXTURE	AFF	ABOVE FINISHED FLOOR
	FLUORESCENT WALL-MOUNTED LIGHTING FIXTURE	BCG	BARE COPPER GROUND
	EXIT SIGN-DIRECTIONAL ARROWS AS INDICATED	<E>	EXISTING TO REMAIN
S	SINGLE POLE TOGGLE SWITCH-HUBBELL #1211 MOUNT CENTERLINE 48" AFF	MCB	MAIN CIRCUIT BREAKER
S^M	MOTOR RATED TOGGLE SWITCH WITH INTEGRAL THERMAL OVERLOAD	MLO	MAIN LUGS ONLY
	CONDUIT AND WIRING RUN CONCEALED IN WALLS OR ABOVE CEILING	MRCT	MULTI-RATIO CURRENT TRANSFORMER
	CONDUIT AND WIRING RUN IN OR BELOW FLOOR OR BELOW GRADE	<N>	NEW
	CONDUIT AND WIRING RUN EXPOSED ON ROOF OR WALLS	OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
	NEUTRAL AND PHASE OR SWITCHED CONDUCTOR RESPECTIVELY	PT	POTENTIAL TRANSFORMER
	GROUND CONDUCTOR, GREEN INSULATED	<R>	EXISTING DEVICE TO BE REMOVED
L-1,3	HOMERUN TO PANEL (CIRCUIT NUMBERS INDICATED)	<RE>	NEW LOCATION OF RELOCATED DEVICE
	CONDUIT TURNED UP; CONDUIT TURNED DOWN RESPECTIVELY	<RL>	EXISTING DEVICE TO BE RELOCATED
	WIRING IN FLEXIBLE METALLIC CONDUIT	SWBD	SWITCHBOARD
	DUPLEX RECEPTACLE, 125V-1P-20A - MOUNT CENTERLINE 18" AFF UON	UON	UNLESS OTHERWISE NOTED
	DOUBLE DUPLEX RECEPTACLE, 125V-1P-15A - MOUNT CENTERLINE 18" AFF UON	WP	WEATHERPROOF
	DUPLEX RECEPTACLE, 125V-1P-20A, GROUND FAULT CURRENT INTERRUPTING TYPE - MOUNT CENTERLINE 18" AFF UON		MOTOR STARTER, COMBINATION STARTER
J	JUNCTION BOX (JB)		COMBINATION STARTER
	PULL BOX, SIZE AS INDICATED	T	TRANSFORMER
P	PUMP MOTOR	H	CAST-IN-PLACE HANDHOLE, SIZE AS INDICATED
V	VENTILATING FAN MOTOR		PANELBOARD, SURFACE MOUNTED
H	UNIT HEATER FAN MOTOR		PANELBOARD, FLUSH MOUNTED DISTRIBUTION
F	FAN COIL UNIT MOTOR		DISTRIBUTION PANELBOARD, SWITCHBOARD
D	DAMPER MOTOR	M	MULTI FUNCTION KILOWATT HOUR DEMAND METER (PLANS)
	MOTOR, AS INDICATED	KWH	MULTI-FUNCTION KILO-WATT HOUR DEMAND METER (SINGLE-LINE)
	NEW AND RELOCATED LIGHTING FIXTURE OR DEVICE	1	FIRE ALARM SYSTEM CONTROL PANEL
	EXISTING TO BE REMOVED	9	FIRE ALARM SYSTEM DUCT SMOKE DETECTOR
	EXISTING TO REMAIN	16	FIRE ALARM SYSTEM SUPERVISED REMOTE POWER SUPPLY
F	SAFETY SWITCH, FUSED	E1	ELECTRICAL NOTE REFERENCE
	SAFETY SWITCH, NON-FUSED	2 / E2	DETAIL DESIGNATION (E2) SHEET ON WHICH DETAIL DRAWN
		4#400KCMIL, 1#4/0G-(5)4"C.	INDICATED SIZE AND NUMBER OF CONDUCTORS INSTALLED IN EACH OF FIVE (5) 4" CONDUITS

PANELBOARD AND FEEDER SCHEDULE

MARK	MAINS	BRANCH	BRANCH DES.	BRANCH SIZE	FEEDING
MSB <E>	2000A MCB 2000A BUS 480/277VAC 3ø,4W	1-60A-3P 1-90A-3P 2-225A-3P 2-200A-3P 2-125A-3P 1-225A-3P 1-250A-3P 2-400A-3P 3-3P	1 2 3,4 5,6 7,8 9 10 12,14 11,13	EXISTING EXISTING EXISTING EXISTING EXISTING 4#4/0,1#4G-2 1/2"C. EXISTING EXISTING ---	EXISTING EXISTING EXISTING EXISTING EXISTING PANEL "W4A" EXISTING EXISTING SPACE
DP <E>	600A MLO 600A BUS 480/277VAC 3ø,4W	1-225A-3P 1-20A-3P 1-30A-3P 1-30A-3P 1-50A-3P 3-70A-3P 1-100A-3P 1-80A-3P 1-50A-3P 4-3P	1/2 (SUB FEED) 3 4 5 6 7-9 10 11 12 13-16	EXISTING EXISTING 3#10,1#10G-3/4"C. EXISTING 3#6,1#10G-1"C. EXISTING EXISTING EXISTING 3#6,1#10G-1"C. ---	EXISTING EXISTING COOLING TOWER EAN EXISTING COOLING TOWER PUMP EXISTING EXISTING EXISTING COOLING TOWER PUMP SPACE
W3A <E>	125A MCP 225A BUS 208/120VAC 3ø,4W	26-20A-1P 3-20A-2P 2-20A-1P 1-70A-2P 1-30A-2P 2-20A-1P 1-20A-1P 1-1P	1-25,27 26,28-32 33,34 35,37 36,38 39,40 41 42	EXISTING EXISTING EXISTING EXISTING EXISTING EXISTING 2#12,1#12G-3/4"C. ---	EXISTING EXISTING EXISTING EXISTING EXISTING EXISTING ROOF RECEPTACLES SPACE
A <E>	400A MCB 400A BUS 208/120VAC 3ø,4W	15-20A-1P 1-30A-1P 1-100A-2P 1-100A-3P 1-50A-3P 1-50A-3P 1-100A-3P 1-30A-3P 1-50A-3P	1-12,14,16,18 13 15,17 19,21,23 20,22,24 25,27,29 26,28,30 31,33,35 32,34,36	EXISTING EXISTING EXISTING --- 3#6,1#10G-1"C. EXISTING --- --- ---	EXISTING EXISTING EXISTING SPARE AHU-1 EXISTING SPARE SPARE SPARE
W4A <N>	225A MLO 225A BUS 480/277VAC 3ø,4W 14KAIC	1-70A-3P 2-50A-3P 2-40A-3P 1-50A-3P 6-1P	1,3,5 2,4,6,7,9,11 8,10,12,14,16,18 13,15,17 19-24	3#4,1#8G-1 1/4"C. 3#6,1#10G-1"C. 3#8,1#10G-3/4"C. --- ---	RTU-3 RTU-1, RTU-2 CONDENSING UNITS SPARE SPARE
WGA <E>	225A MLO 225A BUS 208/120VAC 3ø,4W	29-20A-1P 1-20A-1P 1-30A-3P 3-1P	1-29 30 31,33,35 32,34,36	EXISTING 2#12,1#12G-3/4"C. EXISTING ---	EXISTING RECEPTACLE-COOLING TOWER EXISTING SPACE
C <E>	150A MCB 225A BUS 208/120VAC 3ø,4W	1-30A-3P 3-20A-3P 7-20A-2P 11-20A-1P 1-20A-1P 1-30A-2P 2-1P	1,3,5 2,4,6-12 13-25,27 26,28,30-36,38 40 37,39 41,42	EXISTING EXISTING EXISTING EXISTING 2#12,1#12G-3/4"C. EXISTING ---	EXISTING EXISTING EXISTING EXISTING MECHANICAL CONTROL PANEL EXISTING SPACE

JOHN J. GUTH ASSOCIATES, INC.
MECHANICAL AND ELECTRICAL ENGINEERS
208 MILAM STREET SHREVEPORT, LOUISIANA 71101 6339
DESIGNER: J. PATRICK FOREMAN, P.E.
CHECKED BY: JPF

THESE DRAWINGS DO NOT INCLUDE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY.

STATE OF LOUISIANA J. P. FOREMAN REG. No. 23378 PROFESSIONAL ENGINEER 03/13/13

JOHN J. GUTH ASSOCIATES, INC.
MECHANICAL AND ELECTRICAL ENGINEERS
SHREVEPORT, LOUISIANA 71101
FAX. 318-221-8717
208 MILAM STREET
TEL. 318-221-8638

REPLACE PRESSBOX AND SKYBOX HVAC
MALONE STADIUM
UNIVERSITY OF LOUISIANA AT MONROE

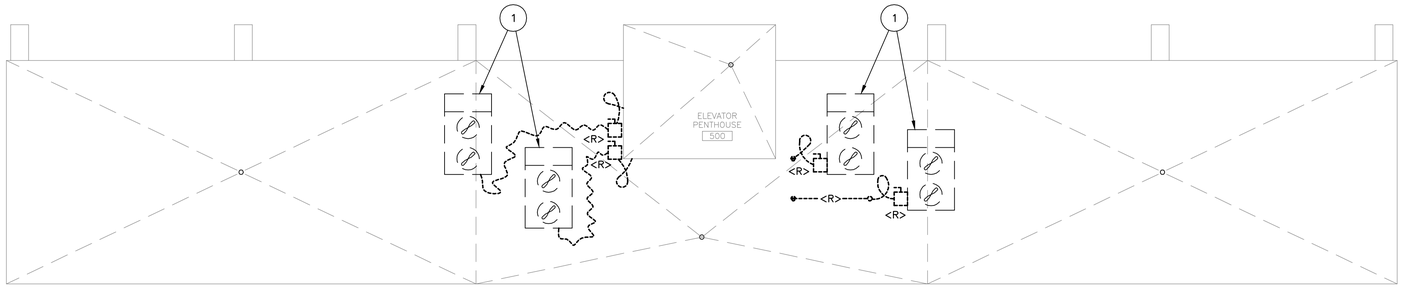
REVISIONS
1 :
2 :
3 :

JOB NO. 6339

DATE: MARCH 14, 2013

SHEET NO.
E-1
OF

DATE DRAWING LAST SAVED:03/14/13 TIME:13:51:31
DATE DRAWING LAST PLOTTED: 03/14/13 TIME:13:35:28

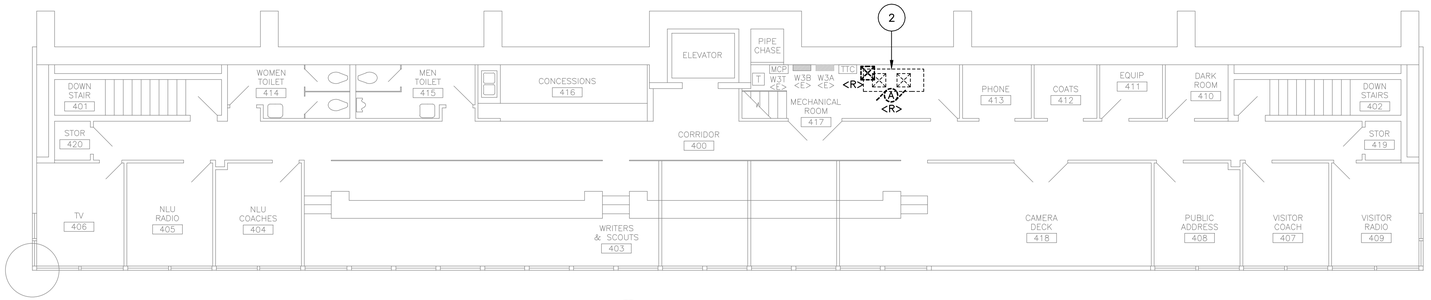


ROOF PLAN 1/8"=1'-0"
ELECTRICAL DEMOLITION

N

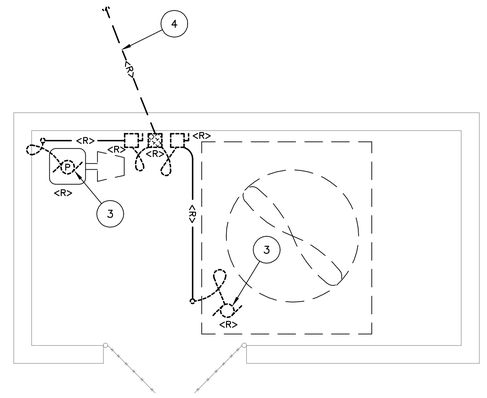
SHEET NOTES:

1. DISCONNECT EXISTING CONDENSING UNITS AND REMOVE FEEDER BACK TO SOURCE OF SUPPLY.
2. DISCONNECT AIR HANDLING UNIT AND PULL FEEDER BACK TO SOURCE OF SUPPLY.
3. DISCONNECT COOLING TOWER AND ASSOCIATED PUMP AND PULL FEEDERS BACK TO SOURCE OF SUPPLY.
4. REMOVE FEEDERS BACK TO SOURCE OF SUPPLY AND ABANDON UNDERGROUND CONDUIT IN PLACE.



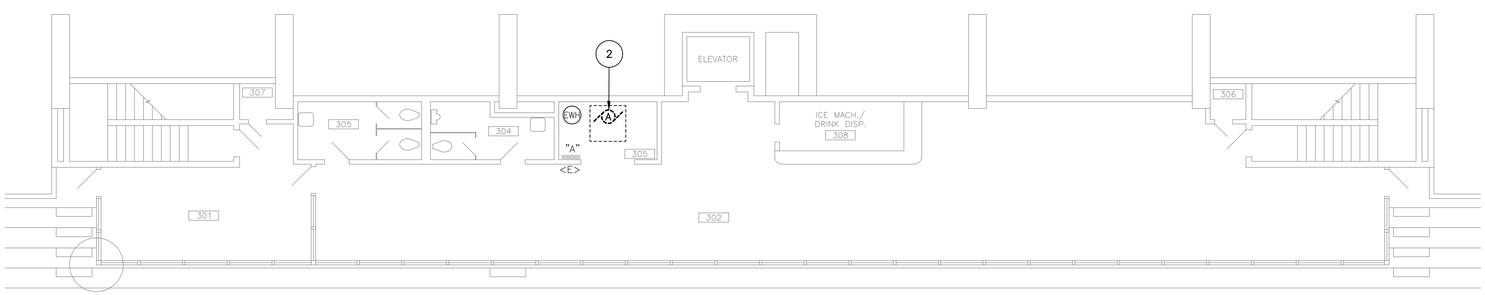
PRESS BOX LEVEL FLOOR PLAN 1/8"=1'-0"
ELECTRICAL DEMOLITION

N



COOLING TOWER YARD 1/4"=1'-0"
ELECTRICAL DEMOLITIION

N



SKY BOX LEVEL FLOOR PLAN 1/8"=1'-0"
ELECTRICAL DEMOLITIION

N

12" 0" 5' 10' 15' 20' 25'
SCALE: 1/8 INCH = 1 FOOT

DATE DRAWING LAST SAVED: 03/14/13 TIME:13:31:11 DATE DRAWING LAST PLOTTED: 03/14/13 TIME:13:34:36

JOHN J. GUTH ASSOCIATES, INC.
CONSULTING MECHANICAL AND ELECTRICAL ENGINEERS
208 MILAM STREET SHREVEPORT, LOUISIANA 71101 6339
DESIGNER: J. PATRICK FOREMAN, P.E.
CHECKED BY: JPF
THESE DRAWINGS DO NOT INCLUDE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY.

STATE OF LOUISIANA
J. P. FOREMAN
REG. No. 22378
PROFESSIONAL ENGINEER
03/14/13

JOHN J. GUTH ASSOCIATES, INC.
MECHANICAL AND ELECTRICAL ENGINEERS
208 MILAM STREET SHREVEPORT, LOUISIANA 71101
TEL. 318-221-8638 FAX. 318-221-8717

REPLACE PRESSBOX AND SKYBOX HVAC
MALONE STADIUM
UNIVERSITY OF LOUISIANA AT MONROE

REVISIONS
1 :
2 :
3 :

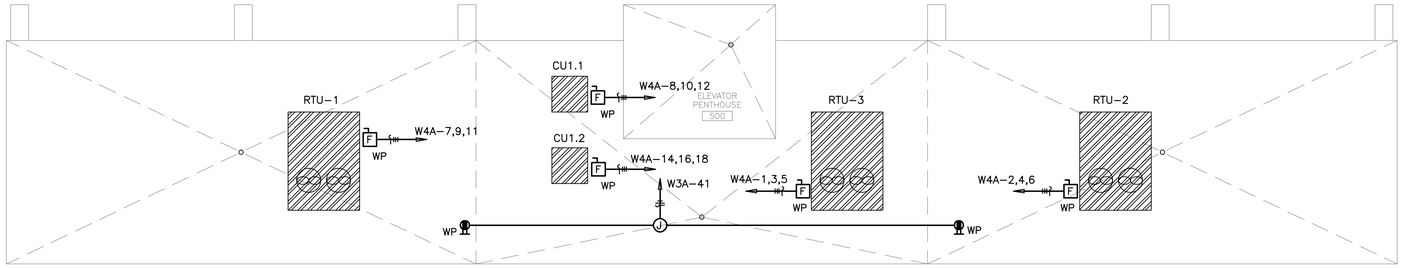
JOB NO. 6339

DATE: MARCH 14, 2013

SHEET NO.

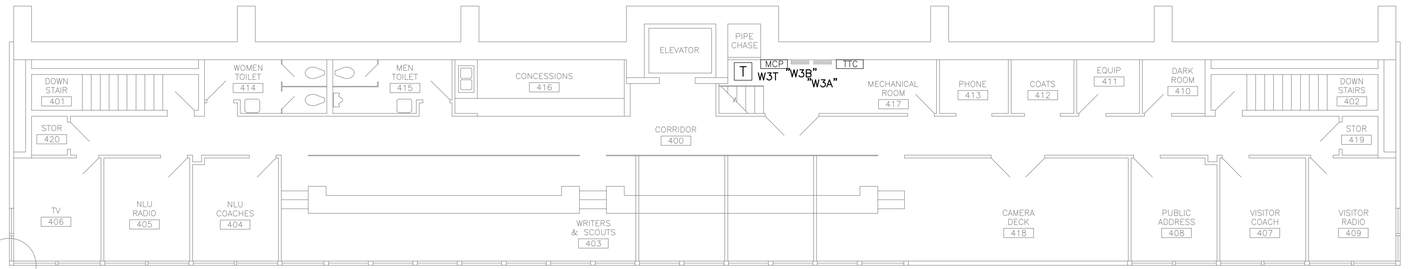
E-2

OF



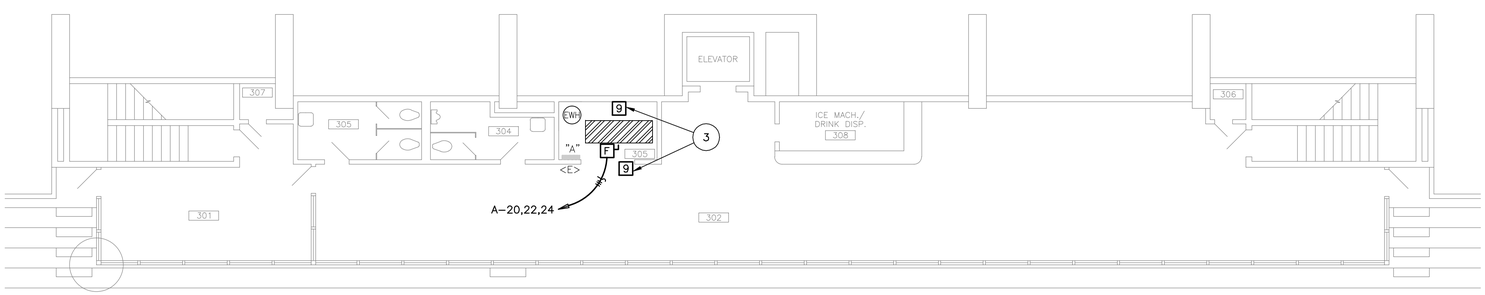
ROOF PLAN 1/8"=1'–0"
ELECTRICAL RENOVATION

N



PRESS BOX LEVEL FLOOR PLAN 1/8"=1'–0"
ELECTRICAL RENOVATION

N

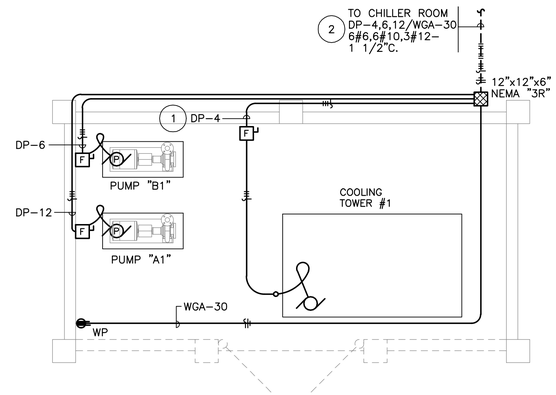


SKY BOX LEVEL FLOOR PLAN 1/8"=1'–0"
ELECTRICAL RENOVATION

N

SHEET NOTES:

1. ROUTE NOTED FEEDER TO PANEL VIA VFD IN CHILLER ROOM.
2. SEE SHEET E4 FOR CONTINUATION.
3. CONNECT DUCT MOUNTED SMOKE DETECTORS TO FACP FOR ALARM AND UNIT CONTROL PANEL FOR UNIT SHUTDOWN.



COOLING TOWER YARD 1/4"=1'–0"
ELECTRICAL RENOVATION

N

12" 0" 5' 10' 15' 20' 25'
SCALE: 1/8 INCH = 1 FOOT

DATE DRAWING LAST SAVED: 03/14/13 TIME:13:30:46
DATE DRAWING LAST PLOTTED: 03/14/13 TIME:13:33:08

JOHN J. GUTH ASSOCIATES, INC.
CONSULTING MECHANICAL AND ELECTRICAL ENGINEERS
208 MILAM STREET SHREVEPORT, LOUISIANA 71101 6339
DESIGNER: J. PATRICK FOREMAN, P.E.
CHECKED BY: JPF

THESE DRAWINGS DO NOT INCLUDE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY.

STATE OF LOUISIANA J. P. FOREMAN REG. No. 23378 PROFESSIONAL ENGINEER 03/13/13

JOHN J. GUTH ASSOCIATES, INC.
MECHANICAL AND ELECTRICAL ENGINEERS
208 MILAM STREET SHREVEPORT, LOUISIANA 71101
TEL. 318-221-8638 FAX. 318-221-8717

REPLACE PRESSBOX AND SKYBOX HVAC
MALONE STADIUM
UNIVERSITY OF LOUISIANA AT MONROE

REVISIONS
1 :
2 :
3 :

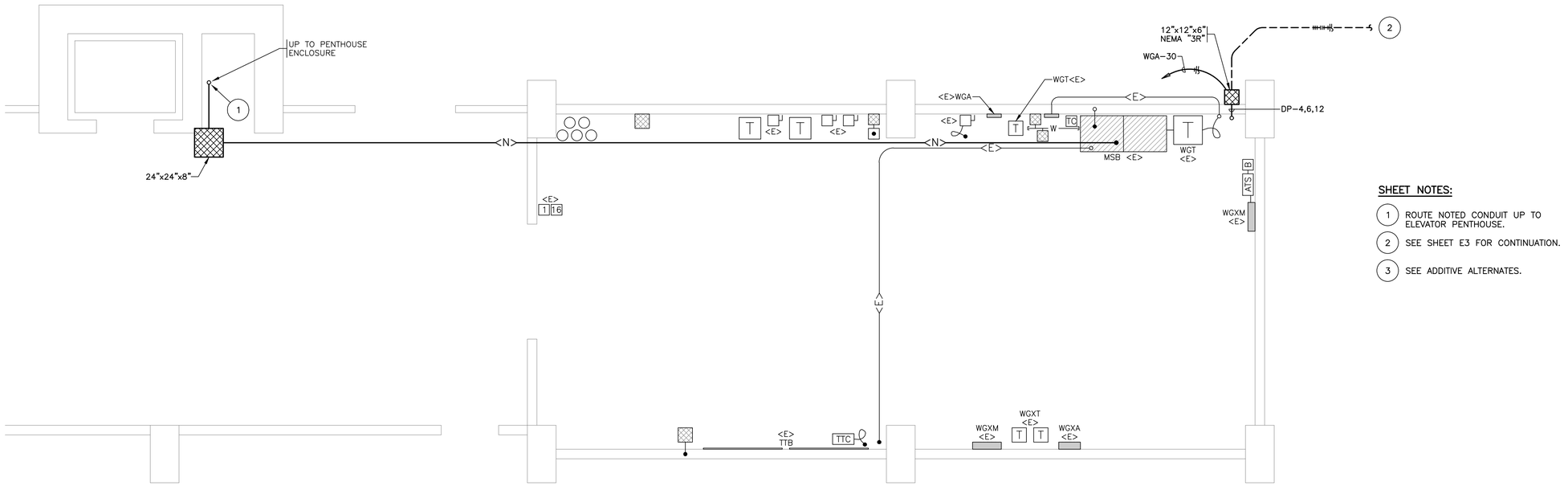
JOB NO. 6339

DATE: MARCH 14, 2013

SHEET NO.

E-3

OF

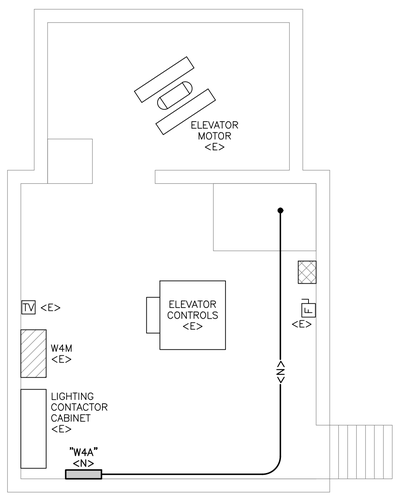


GROUND FLOOR PARTIAL PLAN – WEST SIDE 1/4"=1'-0"
ELECTRICAL RENOVATION

N

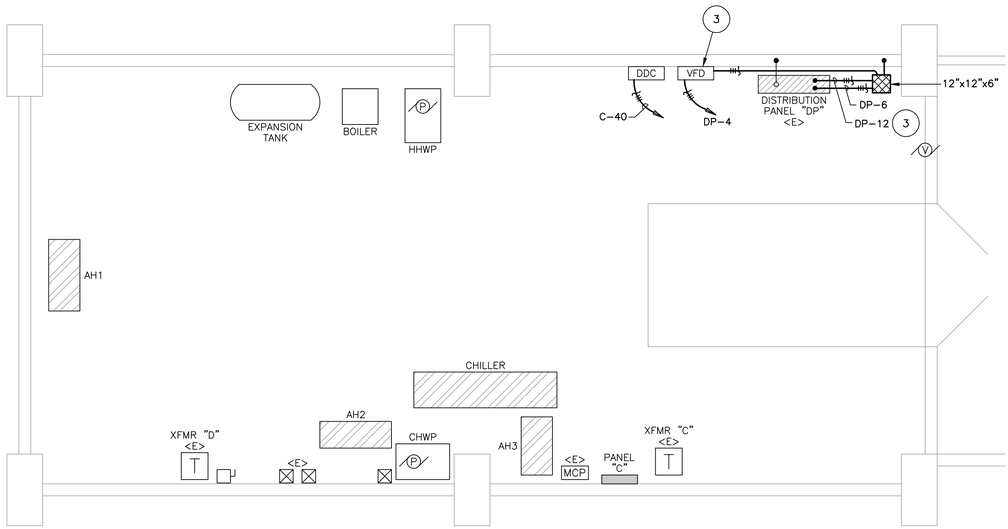
SHEET NOTES:

1. ROUTE NOTED CONDUIT UP TO ELEVATOR PENTHOUSE.
2. SEE SHEET E3 FOR CONTINUATION.
3. SEE ADDITIVE ALTERNATES.



ELEVATOR PENTHOUSE PLAN 1/4"=1'-0"
ELECTRICAL RENOVATION

N



LEVEL 2 PARTIAL PLAN – CHILLER 1/4"=1'-0"
ELECTRICAL RENOVATION

N

12" 0" 5' 10'
SCALE: 1/4 INCH = 1 FOOT

DATE DRAWING LAST SAVED: 03/14/13 TIME:13:30:22
DATE DRAWING LAST PLOTTED: 03/14/13 TIME:13:32:29

JOHN J. GUTH ASSOCIATES, INC.
CONSULTING MECHANICAL AND ELECTRICAL ENGINEERS
208 MILAM STREET 71101 6339
SHREVEPORT, LOUISIANA
DESIGNER: J. PATRICK FOREMAN, P.E.
CHECKED BY: JPF

THESE DRAWINGS DO NOT INCLUDE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY.

STATE OF LOUISIANA J. P. FOREMAN REG. No. 22378 PROFESSIONAL ENGINEER 03/13/13

JOHN J. GUTH ASSOCIATES, INC.
MECHANICAL AND ELECTRICAL ENGINEERS
SHREVEPORT, LOUISIANA 71101
208 MILAM STREET
TEL. 318-221-8638
FAX. 318-221-8717

REPLACE PRESSBOX AND SKYBOX HVAC
MALONE STADIUM
UNIVERSITY OF LOUISIANA AT MONROE

REVISIONS
1 :
2 :
3 :

JOB NO. 6339

DATE: MARCH 14, 2013

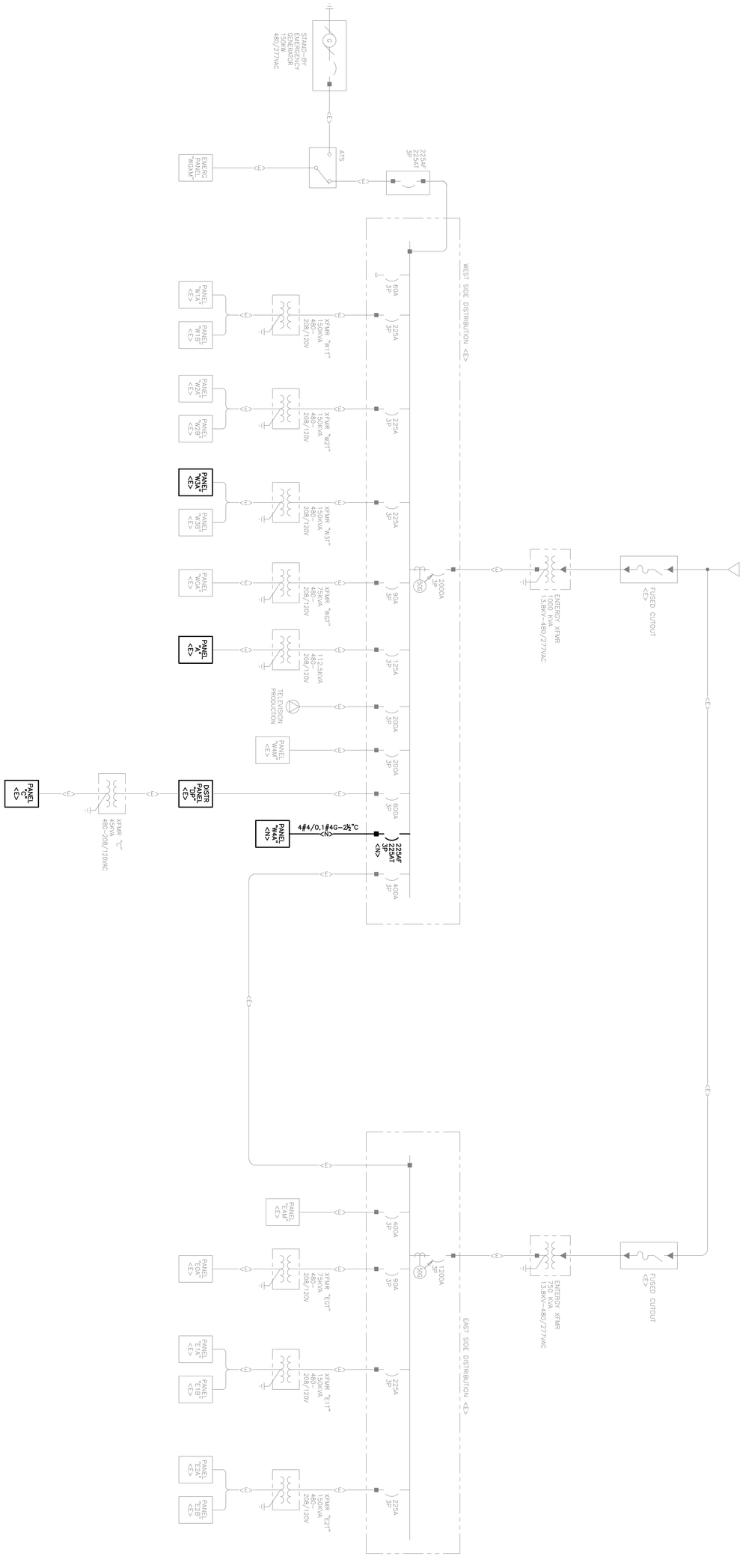
SHEET NO.

E-4

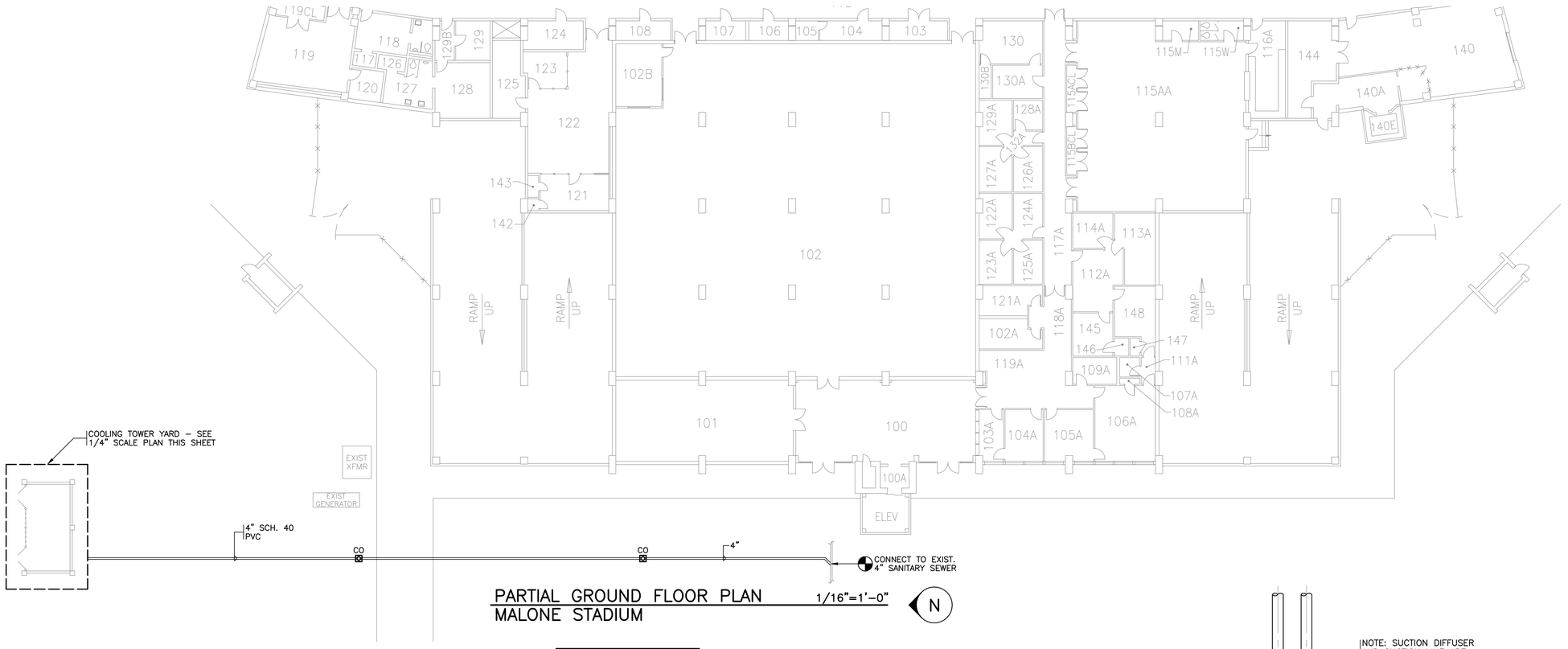
OF

ELECTRICAL SINGLE LINE DIAGRAM

NO SCALE



SHEET NO. E-5 OF	REPLACE PRESSBOX AND SKYBOX HVAC MALONE STADIUM UNIVERSITY OF LOUISIANA AT MONROE	JOHN J. GUTH ASSOCIATES, INC. MECHANICAL AND ELECTRICAL ENGINEERS 208 MILAM STREET SHREVEPORT, LOUISIANA 71101 TEL. 318-221-8638 FAX. 318-221-8717	JOHN J. GUTH ASSOCIATES, INC. CONSULTING MECHANICAL AND ELECTRICAL ENGINEERS 208 MILAM STREET SHREVEPORT, LOUISIANA 71101 6339 DESIGNER: J. PATRICK FOREMAN, P.E. CHECKED BY: JPF THESE DRAWINGS DO NOT INCLUDE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY.
DATE: MARCH 14, 2013 JOB NO. 6339 REVISIONS		STATE OF LOUISIANA J. P. FOREMAN REG. No. 23378 REGISTERED PROFESSIONAL ENGINEER ELECTRICAL ENGINEERING 03/14/13	

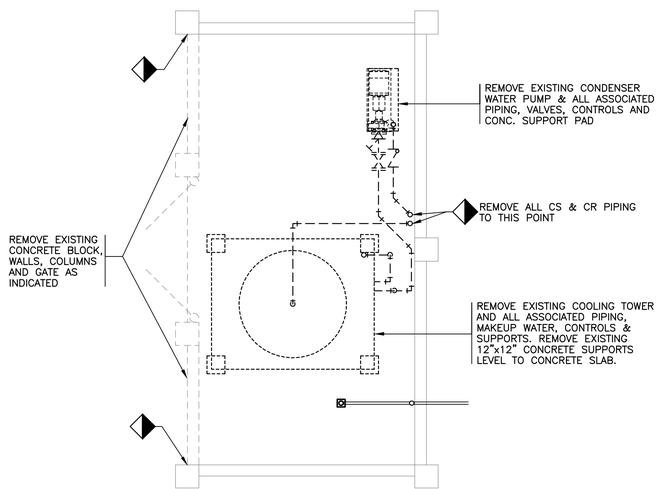


PARTIAL GROUND FLOOR PLAN
MALONE STADIUM

1/16"=1'-0"

N

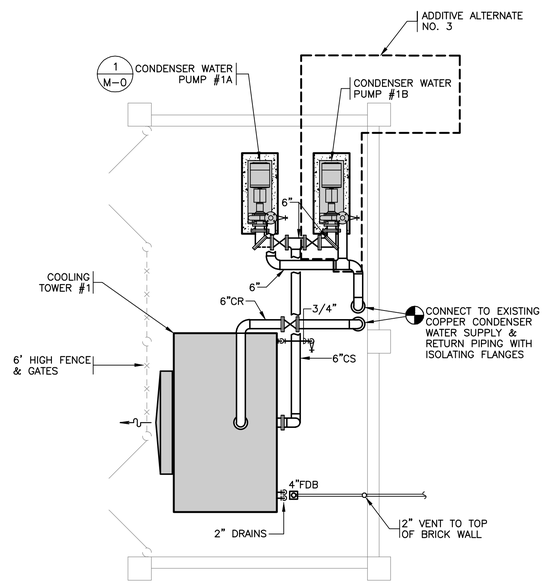
INCLUDE ALL WORK THIS SHEET UNDER ADDITIVE ALTERNATE NO.1 UNLESS NOTED



COOLING TOWER YARD PLAN
DEMOLITION

1/4"=1'-0"

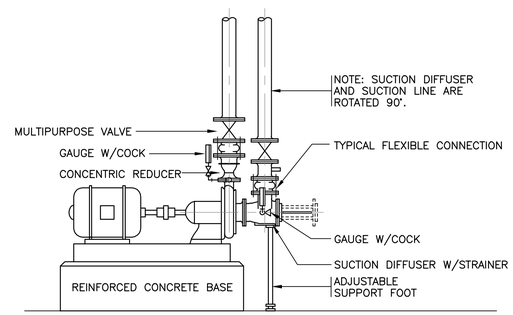
N



COOLING TOWER YARD PLAN
RENOVATION

1/4"=1'-0"

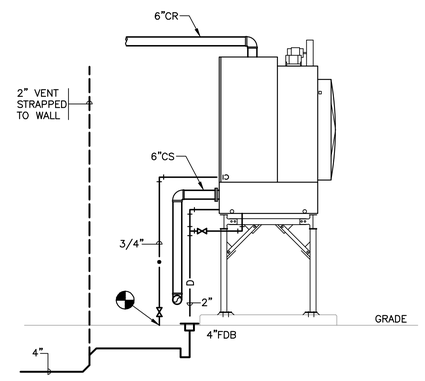
N



1 DETAIL–END SUCTION PUMP

NO SCALE

NOTES: 1. PROVIDE GAUGE PORTS AT PUMP DISCHARGE AND SUCTION DIFFUSER.



2 DETAIL–COOLING TOWER

1/4"=1'-0"

JOHN J. GUTH ASSOCIATES, INC.
CONSULTING MECHANICAL AND ELECTRICAL ENGINEERS
208 MILAM STREET SHREVEPORT, LOUISIANA 71101 6339
DESIGNER: JOHN WILSON P.E.
CHECKED BY: JJW

THESE DRAWINGS DO NOT INCLUDE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY.

STATE OF LOUISIANA JOHN C. WILSON REG. No. 28905 PROFESSIONAL ENGINEER IN MECHANICAL ENGINEERING 3/14/2013

JOHN J. GUTH ASSOCIATES, INC.
MECHANICAL AND ELECTRICAL ENGINEERS
SHREVEPORT, LOUISIANA 71101
FAX. 318-221-8717
208 MILAM STREET
TEL. 318-221-8638

REPLACE PRESSBOX AND SKYBOX HVAC
MALONE STADIUM
UNIVERSITY OF LOUISIANA AT MONROE

REVISIONS

1 :
2 :
3 :

JOB NO. 6339

DATE: MARCH 14, 2013

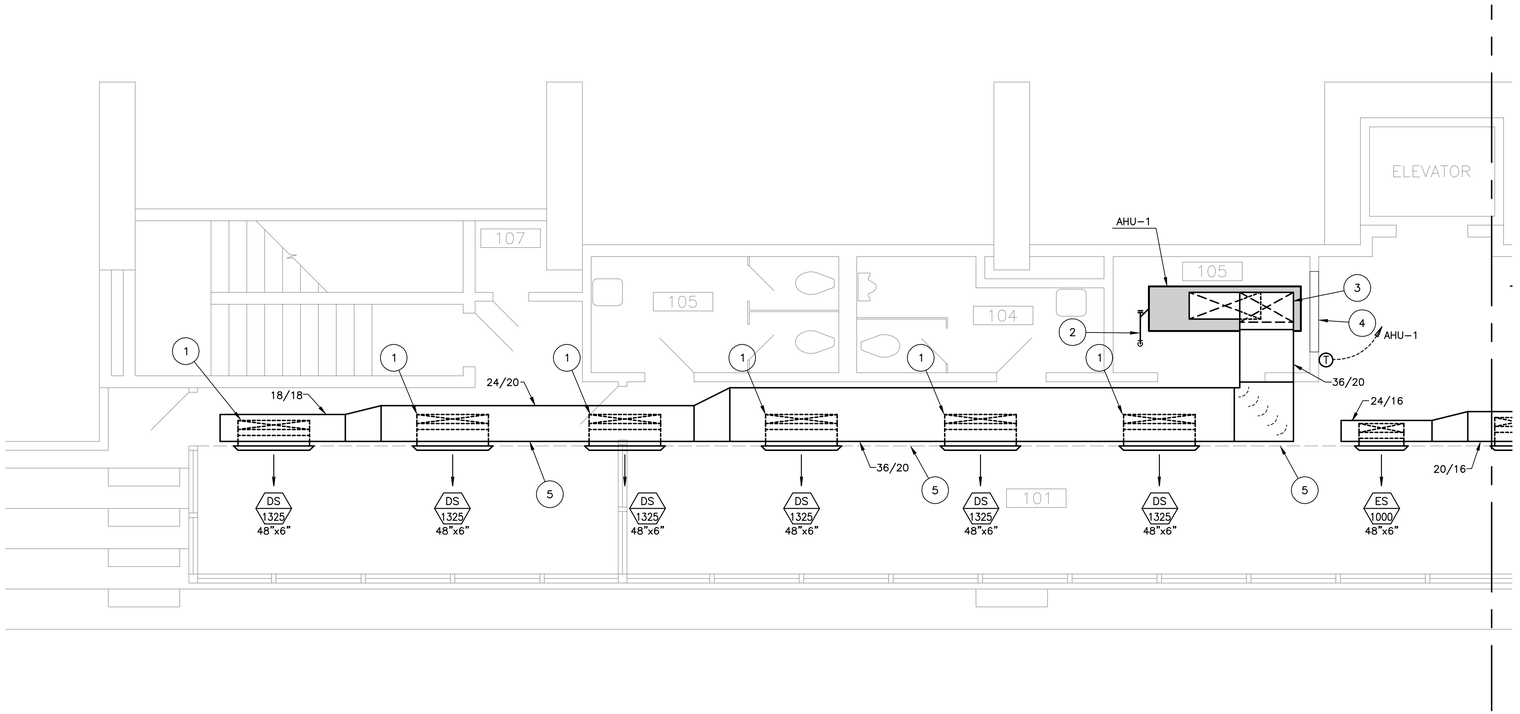
SHEET NO.

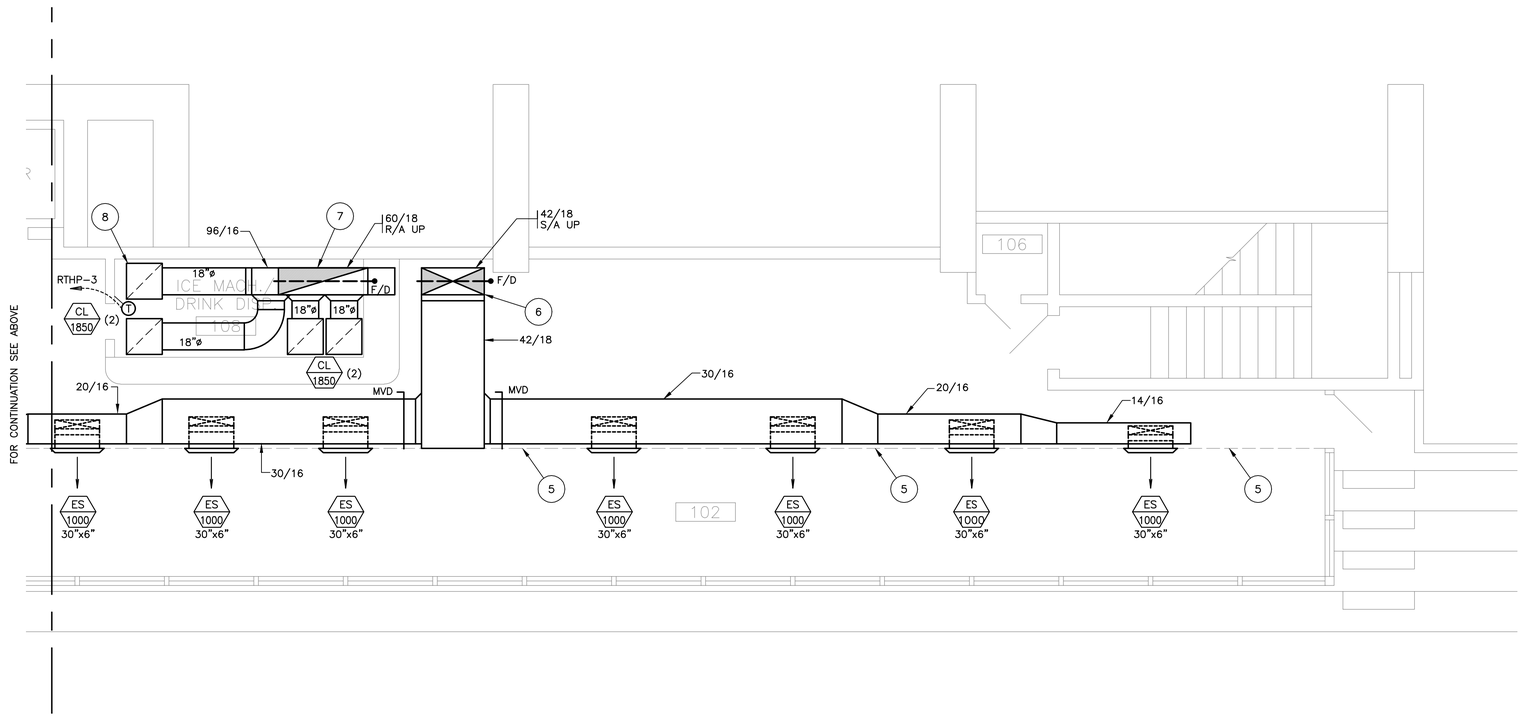
M-0

OF

DATE DRAWING LAST PLOTTED: 03/20/13 TIME:10:07:49

DATE DRAWING LAST SAVED: 03/20/13 TIME:10:08:38





1 FIRST FLOOR PLAN — 1/4"=1'-0"
HVAC RENOVATION

N

NOTES BY SYMBOL: ◯

1. CONNECT 48"x6" SUPPLY TO BOTTOM OF MAIN SUPPLY DUCT
2. ROUTE 1" CONDENSATE DRAIN PIPE TO CLOSEST FLOOR DRAIN.
3. 36"x20" SUPPLY AIR DUCT UP IN CEILING SPACE, TRANSITION TO UNIT SUPPLY AIR OPENING AS REQUIRED. PROVIDE FLEXIBLE CONNECTION.
4. EXISTING RETURN AIR GRILLE TO REMAIN AND BE REUSED.
5. VERTICAL SIDE OF EXISTING FURR DOWN, INSTALL NEW DRUM LOUVERS ON THIS SIDE.
6. 42"x18" SUPPLY AIR DUCT UP TO MECHANICAL ROOM ON FLOOR ABOVE. PROVIDE FIRE DAMPER AT FLOOR PENETRATION.
7. 60"x18" RETURN AIR DUCT UP TO MECHANICAL ROOM ON FLOOR ABOVE. PROVIDE FIRE DAMPER AT FLOOR PENETRATION.
8. PROVIDE 24"x24"x30" HIGH SHEET METAL RETURN PLENUM ON TOP OF RETURN AIR GRILLE CONNECT PLENUM TO 96"x18" RETURN AIR DUCT WITH 18"ø DUCT (COMBINATION SOLID AND FLEXIBLE).

12" 0" 5' 10'
SCALE: 1/4 INCH = 1 FOOT

JOHN J. GUTH ASSOCIATES, INC.
CONSULTING MECHANICAL AND ELECTRICAL ENGINEERS
208 MILAM STREET SHREVEPORT, LOUISIANA 71101 6339
DESIGNER: MIKE BALUNA
CHECKED BY: JGW

THESE DRAWINGS DO NOT INCLUDE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY.

STATE OF LOUISIANA JOHN C. WILSON REG. No. 19262 PROFESSIONAL ENGINEER IN MECHANICAL ENGINEERING

JOHN J. GUTH ASSOCIATES, INC.
MECHANICAL AND ELECTRICAL ENGINEERS
208 MILAM STREET SHREVEPORT, LOUISIANA 71101
TEL. 318-221-8638 FAX. 318-221-8717

REPLACE PRESSBOX AND SKYBOX HVAC
MALONE STADIUM
UNIVERSITY OF LOUISIANA AT MONROE

REVISIONS
1 :
2 :
3 :

JOB NO. 6339

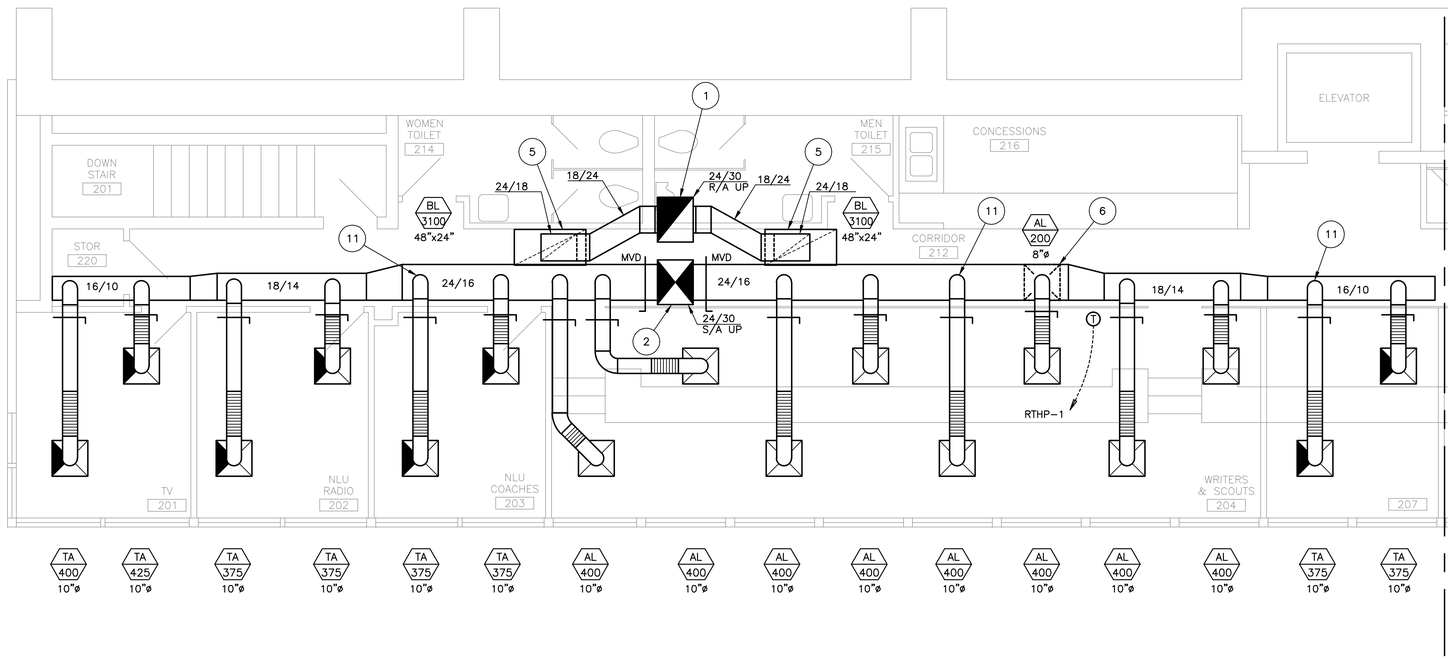
DATE: MARCH 14, 2013

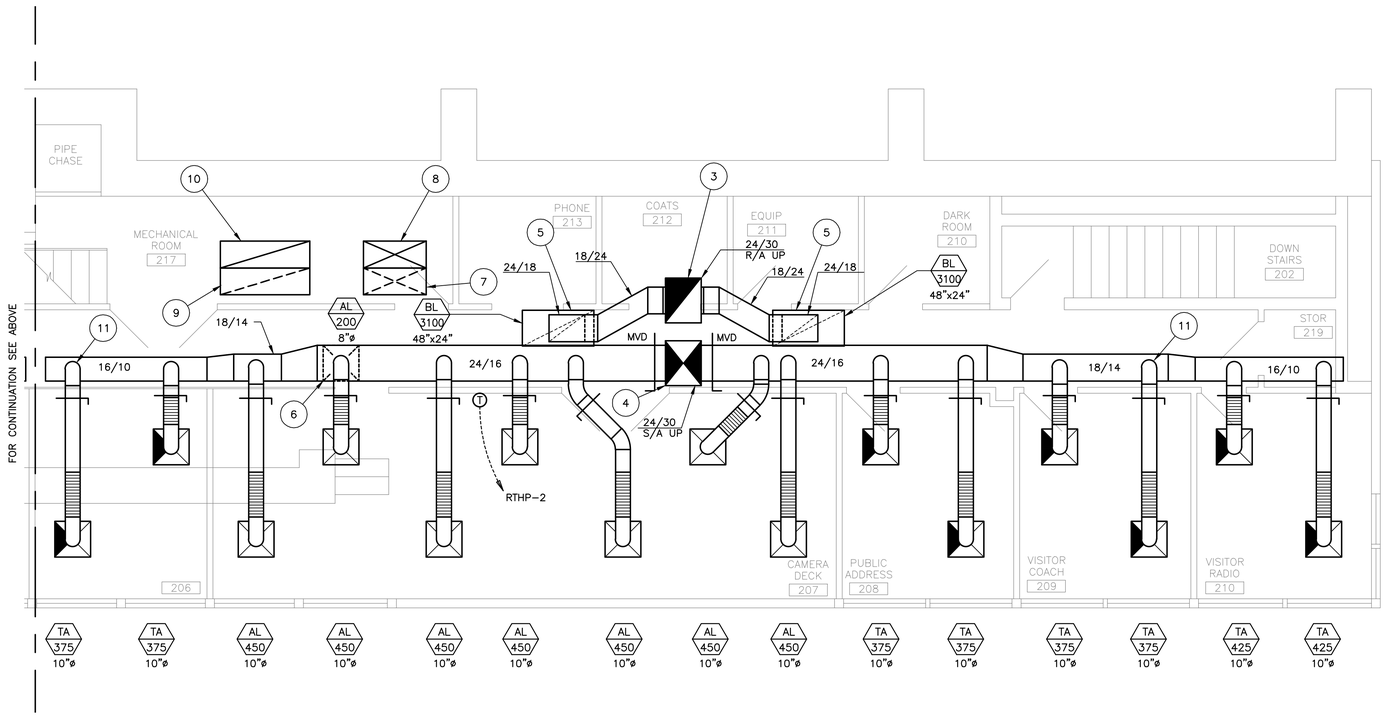
SHEET NO.

M-1

OF

DATE DRAWING LAST SAVED:03/14/13 TIME:09:13:15 DATE DRAWING LAST PLOTTED: 03/14/13 TIME:09:13:16





2 SECOND FLOOR PLAN HVAC RENOVATION

1/4"=1'-0"

N

MECHANICAL SYMBOLS

SYMBOL	DESCRIPTION
— — CS — —	EXISTING CONDENSER WATER SUPPLY TO BE REMOVED
—— CS ——	EXISTING CONDENSER WATER SUPPLY TO REMAIN
—— CS ——	NEW CONDENSER WATER SUPPLY
— — CR — —	EXISTING CONDENSER WATER RETURN TO BE REMOVED
—— CR ——	EXISTING CONDENSER WATER RETURN TO REMAIN
—— CR ——	NEW CONDENSER WATER RETURN
— — D — —	EXISTING CONDENSATE DRAIN LINE TO BE REMOVED
—— D ——	EXISTING CONDENSATE DRAIN LINE TO REMAIN
—— D ——	NEW CONDENSATE DRAIN LINE
	EXISTING SUPPLY AIR DUCT TO BE REMOVED. CAP AIRTIGHT
	EXISTING SUPPLY AIR DUCT TO REMAIN
	NEW AIR DUCT
	EXISTING SUPPLY AIR DIFFUSER TO BE REMOVED
	NEW SUPPLY AIR DIFFUSER– SEE DIFFUSER SCHEDULES
	EXISTING RETURN AIR GRILLE TO REMAIN
	NEW RETURN AIR REGISTER– SEE RETURN REGISTER SCHEDULES
T	EXISTING ROOM THERMOSTAT TO BE REMOVED
T	NEW ROOM THERMOSTAT
F	FIRE DAMPER
	GATE VALVE–2 1/2" & LARGER, BALL VALVE–2" & SMALLER
	MULTIPURPOSE PUMP VALVE
	STRAINER (WITH DRAIN VALVE)
	ELBOW DOWN, ELBOW UP
	TEE DOWN, TEE UP
	CONCENTRIC REDUCER, ECCENTRIC REDUCER
	UNION
	FLEXIBLE CONNECTOR
	THERMOMETER
	WATER PRESSURE GAUGE WITH COCK
A.V.	AIR ELIMINATOR OR AIR VENT
FD	FLOOR DRAIN
	DIRECTION OF FLOW
	POINT OF CONNECTION TO EXISTING PIPING OR DUCTWORK
A / M1	DETAIL DESIGNATION SHEET WHERE DETAIL IS LOCATED
	TERMINATION OF DEMOLITION

NOTES BY SYMBOL ' ◯ '

1. 24"x30" RETURN AIR DUCT UP TO ROOFTOP HEAT PUMP RTHP–1. TRANSITION TO ROOFTOP RETURN AIR OPENING IN CEILING SPACE.
2. 24"x30" SUPPLY AIR DUCT UP TO ROOFTOP HEAT PUMP RTHP–1. TRANSITION TO ROOFTOP SUPPLY AIR OPENING IN CEILING SPACE.
3. 24"x30" RETURN AIR DUCT UP TO ROOFTOP HEAT PUMP RTHP–2. TRANSITION TO ROOFTOP RETURN AIR OPENING IN CEILING SPACE.
4. 24"x30" SUPPLY AIR DUCT UP TO ROOFTOP HEAT PUMP RTHP–2. TRANSITION TO ROOFTOP SUPPLY AIR OPENING IN CEILING SPACE.
5. PROVIDE 48"x24"x12" HIGH SHEETMETAL RETURN AIR PLENUM ABOVE RETURN AIR GRILLE.
6. 8"ø FROM BOTTOM OF SUPPLY AIR DUCT TO DIFFUSER.
7. 42"x18" SUPPLY AIR DUCT DOWN TO FLOOR BELOW OFFSET DUCT TO ROOF PENETRATION LOCATION.
8. 42"x18" SUPPLY AIR DUCT UP THRU ROOF TO RTHP–3.
9. 60"x18" RETUEN AIR DUCT DOWN TO FLOOR BELOW OFFSET DUCT TO ROOF PENETRATION LOCATION.
10. 60"x18" RETURN AIR DUCT UP THRU ROOF TO RTHP–3.

12" 0" 5' 10'
SCALE: 1/4 INCH = 1 FOOT

JOHN J. GUTH ASSOCIATES, INC.
MECHANICAL AND ELECTRICAL ENGINEERS
208 MILAM STREET SHREVEPORT, LOUISIANA 71101 6339
DESIGNER: MIKE BALUNA
CHECKED BY: JJW

THESE DRAWINGS DO NOT INCLUDE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY.

STATE OF LOUISIANA JOHN C. WILCOX REG. No. 19905 PROFESSIONAL ENGINEER IN MECHANICAL ENGINEERING 3/14/2013

JOHN J. GUTH ASSOCIATES, INC.
MECHANICAL AND ELECTRICAL ENGINEERS
208 MILAM STREET SHREVEPORT, LOUISIANA 71101
TEL. 318-221-8638 FAX. 318-221-8717

REPLACE PRESSBOX AND SKYBOX HVAC
MALONE STADIUM
UNIVERSITY OF LOUISIANA AT MONROE

REVISIONS
1 :
2 :
3 :

JOB NO. 6339

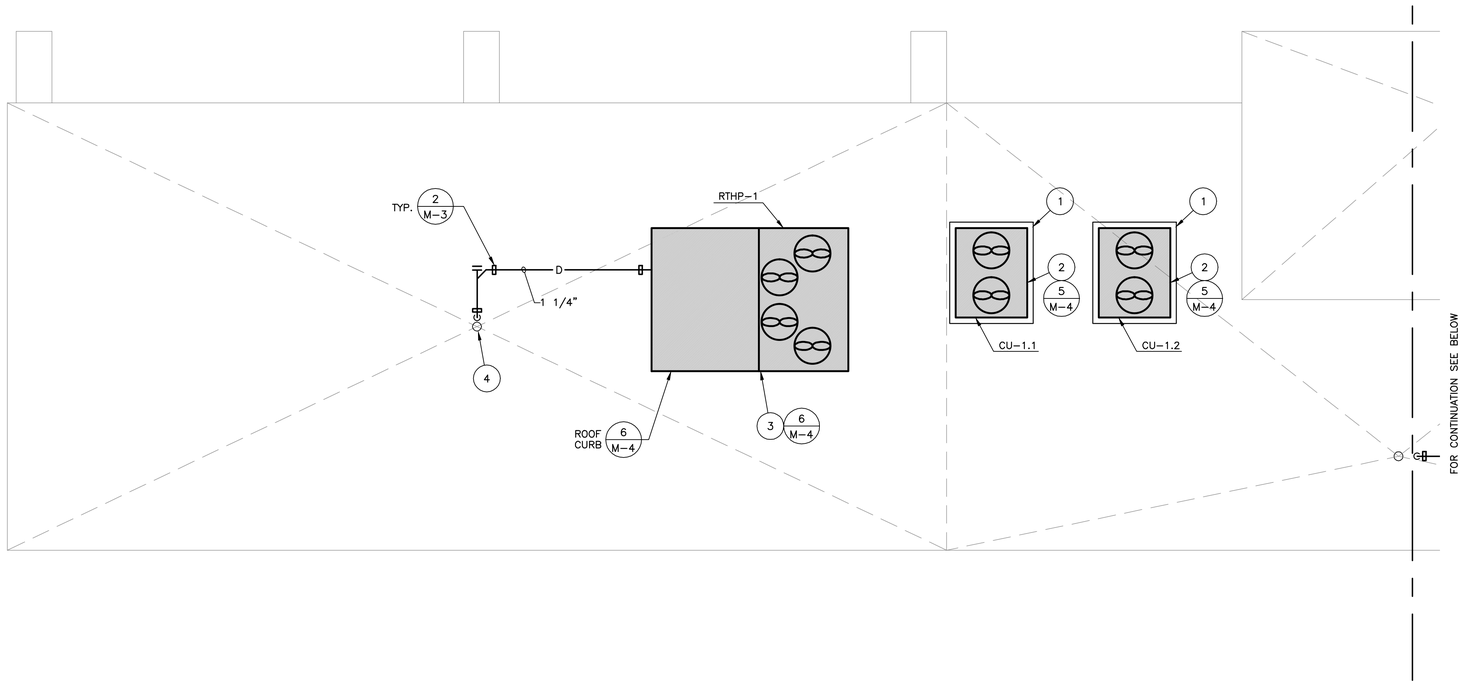
DATE: MARCH 14, 2013

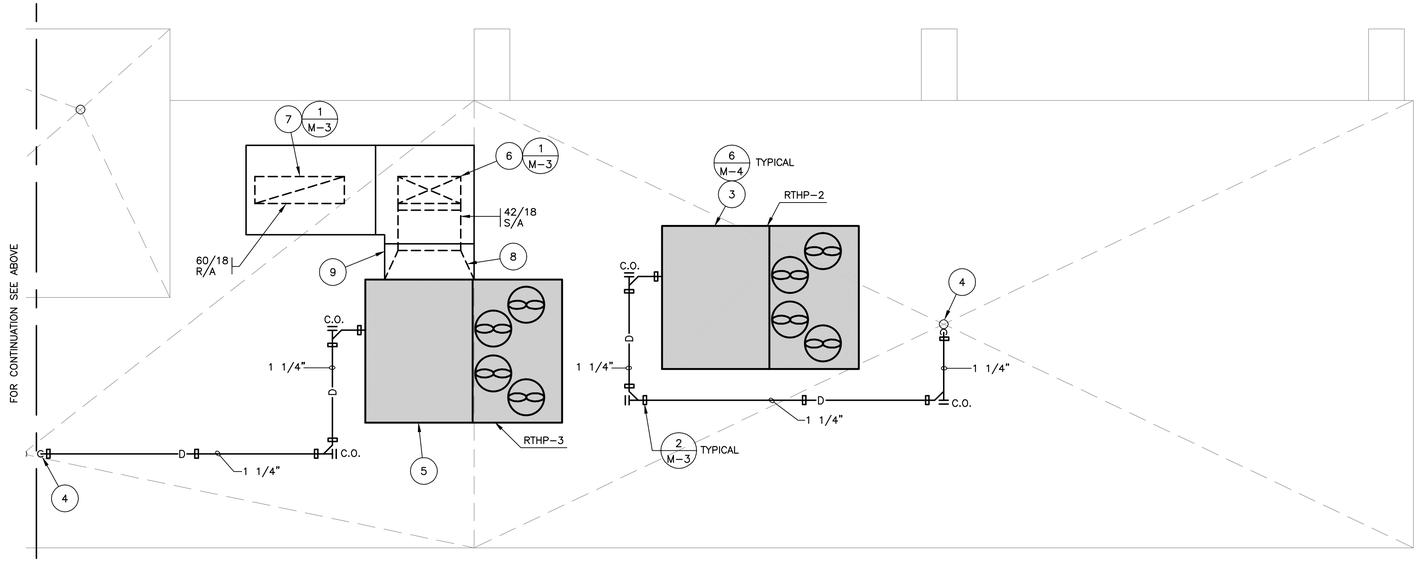
SHEET NO.

M-2

OF

DATE DRAWING LAST SAVED: 03/14/13 TIME:09:12:06 DATE DRAWING LAST PLOTTED: 03/14/13 TIME:09:10:41





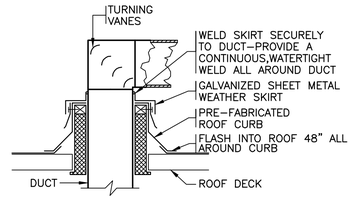
3 ROOF PLAN HVAC NEW WORK

1/4"=1'-0"

N

NOTES BY SYMBOL: ⟨ ⟩

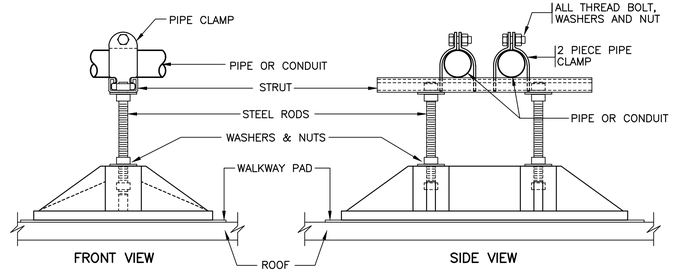
1. PROVIDE 3" THICK UV RESISTANT PLASTIC CONDENSING UNIT PAD MANUFACTURER: 'DIVERSITECH' OR EQUIVALENT MODEL: NO.: E-LITE
2. AS MUCH AS POSSIBLE, REUSE EXISTING ROOF PENETRATIONS AND ROUTING FOR NEW REFRIGERANT LINES FROM CONDENSING UNITS TO AIR HANDLERS USE MANUFACTURER RECOMMENDED REFRIGERANT LINE SIZES.
3. PROVIDE 14" HIGH ROOF CURB UNDER UNIT.
4. ROUTE 1 1/4" CONDENSATE DRAIN LINE TO EXISTING ROOF DRAIN.
5. MANUFACTURER PROVIDED HORIZONTAL ROOF CURB AND HORIZONTAL RETURN AIR PANEL UNIT.
6. 42"x18" SUPPLY AIR DUCT DOWN THRU ROOF TO MECHANICAL ROOM ON FLOOR BELOW PROVIDE 1" THICK ACCOUSTIC LINER ON DUCT INSTALLED ON ROOF.
7. 60"x18" RETURN AIR DUCT DOWN THRU ROOF TO MECHANICAL ROOM ON FLOOR BELOW. PROVIDE 1" THICK ACCOUSTIC LINER ON DUCT INSTALL ON ROOF.
8. TRANSITION TO UNIT SUPPLY AIR OPENING AS REQUIRED. PROVIDE FLEXIBLE CONNECTION.
9. TRANSITION TO UNIT RETURN AIR OPENING AS REQUIRED, PROVIDE FLEXIBLE CONNECTION.



1 DETAIL-DUCT PENETRATION THRU ROOF

NO SCALE

NOTE: REFER TO STRUCTURAL DETAILS FOR ANGLE FRAME SUPPORTS AT PENETRATION



2 DETAIL-PIPE & CONDUIT SUPPORT ON ROOF

NO SCALE

PIPE SIZES 2" AND SMALLER

NOTES:

1. PROVIDE WALKWAY PAD AS RECOMMENDED BY ROOFING MANUFACTURER.
2. PIPE SUPPORT SHALL BE ONE OF THE FOLLOWING OR APPROVED EQUAL:
   A. PORTABLE PIPE HANGERS, INC. MODEL PP10S
   B. MAPA PRODUCTS, MODEL MS-3.
   C. ROOFTOP BLOX, MODEL RTB-01 (CONTRACTOR SUPPLIED HARDWARE REQUIRED).
3. ALL STRUTS, RODS, WASHERS, NUTS, BOLTS, CLAMPS, ETC. SHALL BE HOT DIPPED GALVANIZED (ASTM A123).

12" 0" 5' 10'

SCALE: 1/4 INCH = 1 FOOT

JOHN J. GUTH ASSOCIATES, INC.
CONSULTING MECHANICAL AND ELECTRICAL ENGINEERS
208 MILAM STREET SHREVEPORT, LOUISIANA 71101 6339
DESIGNER: MIKE BALUNA
CHECKED BY: JJW

THESE DRAWINGS DO NOT INCLUDE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY.

STATE OF LOUISIANA JOHN C. WILSON REG. No. 19068 PROFESSIONAL ENGINEER IN MECHANICAL ENGINEERING

JOHN J. GUTH ASSOCIATES, INC.
MECHANICAL AND ELECTRICAL ENGINEERS
208 MILAM STREET SHREVEPORT, LOUISIANA 71101
TEL. 318-221-8638 FAX. 318-221-8717

REPLACE PRESSBOX AND SKYBOX HVAC MALONE STADIUM UNIVERSITY OF LOUISIANA AT MONROE

REVISIONS

1 .
2 .
3 .

JOB NO. 6339

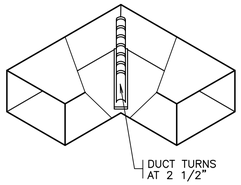
DATE: MARCH 14, 2013

SHEET NO.

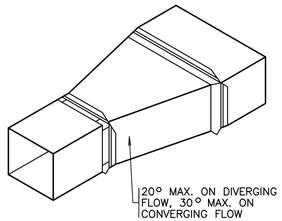
M-3

OF

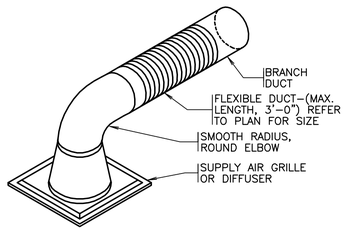
DATE DRAWING LAST SAVED: 03/14/13 TIME:09:39:08
DATE DRAWING LAST PLOTTED: 03/14/13 TIME:09:37:38



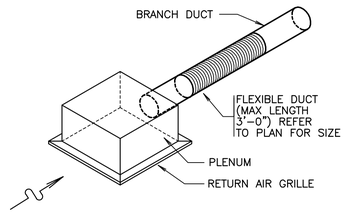
1 DETAIL–TYPICAL ELBOW
NO SCALE



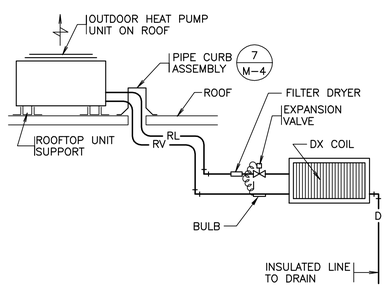
2 DETAIL–DUCT TAPER
NO SCALE



3 DETAIL–ROUND NECK DIFFUSER
NO SCALE



4 DETAIL–RETURN AIR DUCT RUN–OUT
NO SCALE



5 HEAT PUMP SYSTEM PIPING DIAGRAM
NO SCALE

NOTE: THE METHOD AND SIZE OF REFRIGERANT PIPING SHALL BE IN STRICT ACCORDANCE WITH MANUFACTURER'S ENGINEERING AND INSTALLATION DATA. MAXIMUM P.D. 2°.

ROOFTOP HEAT PUMP VERTICAL DISCHARGE SCHEDULE

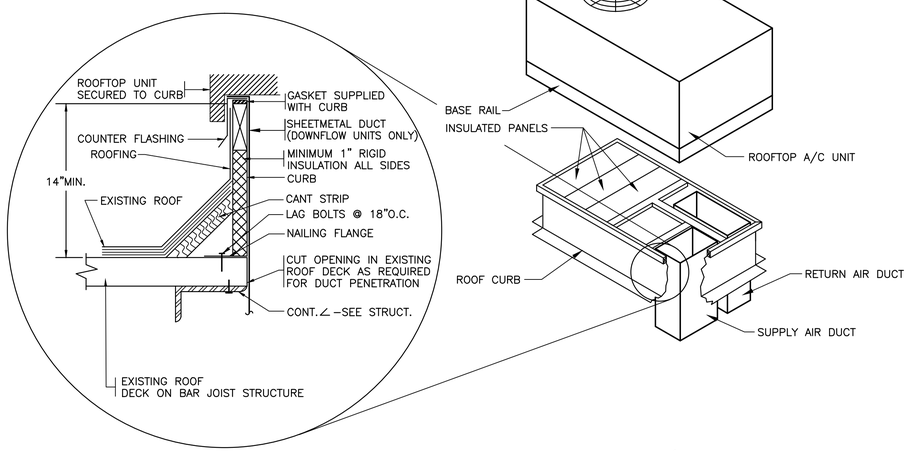
MARK		RTHP - 1	RTHP - 2	RTHP - 3
LOCATION		ROOF	ROOF	ROOF
SERVICE		2ND FLOOR SOUTH	2ND FLOOR NORTH	1ST FLOOR NORTH
TYPE DISCHARGE		VERT DOWNFLOW	VERT DOWNFLOW	HORIZONTAL
FAN				
AIRFLOW	CFM	6500	6500	8000
ESP	IN WG	1.275	1.275	2.15
MIN OUTSIDE AIR	CFM	300	300	600
FAN SPEED	RPM	1050	1050	1325
TYPE DRIVE		BELT	BELT	BELT
MOTOR HP	HP	5	5	10
MOTOR SPEED	RPM	1750	1750	1750
VARIABLE FREQUENCY DRIVE		YES	YES	YES
COOLING				
AIRFLOW	CFM	6500	6500	8000
EAT (DB / WB)	F	80 / 67	80 / 67	80 / 67
TOTAL CAP	MBH	181.2	181.2	228.5
SENS CAP	MBH	141.6	141.6	178.2
POWER	KW	13.5	13.5	16.7
AMBIENT	F	95	95	95
HEATING - HEAT PUMP MODE				
AIRFLOW	CFM	6500	6500	8000
HIGH HEAT CAPACITY	MBH	178.0	178.0	220.0
AMBIENT	F	47	47	47
POWER	KW	16.1	16.1	19.9
LOW HEAT CAPACITY	MBH	104.0	104.0	128.0
AMBIENT	F	17	17	17
POWER	KW	14.9	14.9	18.3
SUPPLEMENTARY ELECTRIC HEAT				
HEATER	KW	11.3	11.3	N / A
HEAT CAPACITY	MBH	38.5	38.5	N / A
ELECTRICAL				
SINGLE POINT CONNECTION		YES	YES	YES
VOLTS / PHASE		460 / 3	460 / 3	460 / 3
MCA	AMP	41	41	57
OCDP	AMP	50	50	70
GENERAL				
NOMINAL TONS		15	15	20
REFRIGERANT		410 A	410 A	410 A
NO OF COMPRESSORS		2	2	2
EER		10.6	10.6	10.6
IEER		10.7	10.7	10.7
FILTER				
TYPE / THICKNESS		T.A. / 2"	T.A. / 2"	T.A. / 2"
MERV		8	8	8
APPROX DIMENSIONS (L X W X H)	FT	11' X 8' X 5'	11' X 8' X 5'	11' X 8' X 5'
APPROX WEIGHT	LBS	2500	2500	3000
MANUFACTURER		"LENNOX"	"LENNOX"	"LENNOX"
MODEL NO		KHA 180 S	KHA 180 S	KHA 240 S
REMARKS		1,2,3,4	1,2,3,4	4,5,6

1. MANUFACTURER PROVIDED 14" HIGH STANDARD ROOF CURB
2. ELECTRIC HEATER CAPACITY RATED AT 208 V / 3 PH
3. SUPPLEMEMTARY ELECTRIC HEATER TO BE ENGAGED WHEN HEAT PUMP REACHES MAX CAPACITY
4. PROVIDE DDC CONTROLS
5.MANUFACTURER PROVIDED HORIZONTAL ROOF CURB, 37" HIGH
6. MANUFACTURER PROVIDED HORIZONTAL RETURN AIR PANEL KIT

SPLIT SYSTEM HEAT PUMP SCHEDULE

		AIR HANDLER	
MARK		AHU - 1	
LOCATION		ROOF	
SERVICE		FIRST FLOOR SOUTH	
TYPE		VERTICAL UPFLOW	
FAN			
AIRFLOW	CFM	8000	
ESP	IN WG	1.150	
MIN OUTSIDE AIR	CFM	N / A	
FAN SPEED	RPM	1000	
TYPE DRIVE		BELT	
MOTOR HP	HP	7 1/2	
MOTOR SPEED	RPM	1750	
VARIABLE FREQUENCY DRIVE		YES	
COOLING			
AIRFLOW	CFM	8000	
EAT (DB / WB)	F	80 / 67	
TOTAL CAP	MBH	236.6	
SENS CAP	MBH	179.8	
AMBIENT	F	95	
HEATING - HEAT PUMP MODE			
AIRFLOW	CFM	8000	
HIGH HEAT CAPACITY	MBH	232.0	
AMBIENT	F	47	
LOW HEAT CAPACITY	MBH	140.0	
AMBIENT	F	17	
ELECTRICAL			
VOLTS / PHASE		208 / 3	
MCA	AMP	31	
OCPD	AMP	50	
FILTER			
TYPE / THICKNESS		T.A. / 2"	
MERV		8	
APPROX DIMENSIONS (L X W X H)	FT	8' X 3' X 5'	
APPROX WEIGHT	LBS	750	
MANUFACTURER		"LENNOX"	
MODEL NO		TAA 240	
		CONDENSING UNITS	
MARK		CU - 1.1	CU - 1.2
NOMINAL TONS		10	10
REFRIGERANT		410 A	410 A
NO OF COMPRESSORS		1	1
EER		10.6	10.6
IEER		11.2	11.2
ELECTRICAL			
VOLTS / PHASE		460 / 3	460 / 3
MCA	AMP	24	24
OCPD	AMP	40	40
APPROX DIMENSIONS (L X W X H)	FT	5' X 4' X 4'	5' X 4' X 4'
APPROX WEIGHT	LBS	750	750
MANUFACTURER		"LENNOX"	"LENNOX"
MODEL NO		TPA 120	TPA 120
REMARKS		1	

1. AIR HANDLER WITH SIDE RETURN AIR OPENING



6 DETAIL–TYPICAL ROOFTOP A/C UNIT CONNECTION
NO SCALE

AIR DIFFUSER GRILLE AND REGISTER SCHEDULE

MARK	FUNCTION	FACE SIZE	BORDER TYPE	THROW PATTERN	DAMPER	FINISH	MANUFACT	MODEL NO	REMARKS
A	SUPPLY	24" X 24"	REFER DRAWINGS	4 - WAY	NO	WHITE	"TITUS"	TMSA	ALUMINUM, LOUVERED DIFFUSER, ROUND NECK
B	RETURN	48" X 24"	REFER DRAWINGS	N / A	NO	WHITE	"TITUS"	50F	ALUMINUM BORDER, EGGCRATE, 1/2" X 1/2" X 1/2" ALUMINUM CORE
C	RETURN	24" X 24"	REFER DRAWINGS	N / A	NO	WHITE	"TITUS"	50F	ALUMINUM BORDER, EGGCRATE, 1/2" X 1/2" X 1/2" ALUMINUM CORE
D	SUPPLY	48" X 6"	REFER DRAWINGS	ADJUST	YES	WHITE	"TITUS"	DL	ALUMINUM FRAME WITH ALUMINUM DRUM, OPPOSED BLADE DAMPER, ROTATING DRUM, PIVOTED BLADES
E	SUPPLY	30" X 6"	REFER DRAWINGS	ADJUST	YES	WHITE	"TITUS"	DL	ALUMINUM FRAME WITH ALUMINUM DRUM, OPPOSED BLADE DAMPER, ROTATING DRUM, PIVOTED BLADES

VARIABLE AIR VOLUME DIFFUSER SCHEDULE

MARK	FACE SIZE	NECK SIZE	THROW PATTERN	DAMPER	FINISH	MANUFACT	MODEL NO	NOTES
TA	24" X 24"	10" RD	4 - WAY	NO	WHITE	"ACUTHERM"	TF - HC	1

1. HEATING AND COOLING

PIPING AND FITTING MATERIAL SCHEDULE

SERVICE	PIPE MATERIAL	JOINT TYPE	FITTING MATERIAL	REMARKS
REFRIGERANT PIPNG	REFRIGERANT SERVICE (SEALED) TYPE 'L' COPPER ASTM B - 88	SIL - FOS (SILVER BRAZED)	WROUGHT COPPER	
CONDENSATE PIPING	SCHEDULE 40 PVC	SOLVENT WELDED	SCHEDULE 40 PVC	
CONDENSER WATER PIPNG	SCHEDULE 40 BLACK STEEL ASTM A - 53	BUTT WELD	MALLEABLE IRON BUTT WELDED	
COOLING TOWER DRAIN PIPING	TYPE 'L', HARD COPPER, ASTM B - 88	50 - 50 SOLDER WITH INTERMEDIATELY CORROSIVE FLUX	WROUGHT COPPER	

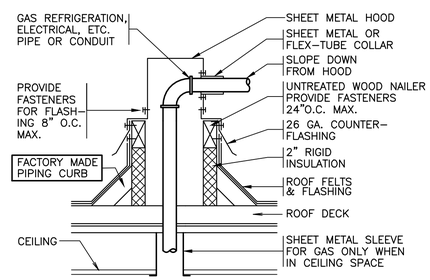
COOLING TOWER SCHEDULE

NO.	# OF CELLS	SERVICE	TOTAL CAPACITY GPM	EWT °F	LWT °F	AMBIENT W.B. TEMP	BASIN HEATER (NO.)–KW	VOLTAGE	FAN DATA CFM	HP EA.	VOLTAGE
1	1	COND WTR	375	95	85	78	NONE	N/A	43480	7.5	480V–3ø

NOTE: UNDER BASE BID, PROVIDE SOFT START ELECTRONIC STARTER IN NEMA 4X ENCLOSURE. UNDER ADDITIVE ALTERNATE #1, PROVIDE VARIABLE FREQUENCY DRIVE. PROVIDE VFD RATED MOTOR UNDER BOTH BASE BID AND ALTERNATE #1.

PUMP SCHEDULE

NO	SERVICE	GPM	HEAD	RPM	HP	VOLTAGE	REMARKS
1A	CONDENSER WATER	375	88'	1750	15	480V–3ø	END SUCTION BASE BID
1B	CONDENSER WATER	375	88'	1750	15	480V–3ø	END SUCTION ALT. #2



7 DETAIL–PIPING THROUGH ROOF DECK
NO SCALE

JOHN J. GUTH ASSOCIATES, INC.
MECHANICAL AND ELECTRICAL ENGINEERS
208 MILAM STREET SHREVEPORT, LOUISIANA 71101
DESIGNER: MIKE BALUNA
CHECKED BY: JJW

THESE DRAWINGS DO NOT INCLUDE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY.

STATE OF LOUISIANA JOHN C. WILSON REG. No. 29062 PROFESSIONAL ENGINEER IN MECHANICAL ENGINEERING

JOHN J. GUTH ASSOCIATES, INC.
MECHANICAL AND ELECTRICAL ENGINEERS
SHREVEPORT, LOUISIANA 71101
FAX. 318-221-8717
208 MILAM STREET
TEL. 318-221-8638

REPLACE PRESSBOX AND SKYBOX HVAC
MALONE STADIUM
UNIVERSITY OF LOUISIANA AT MONROE

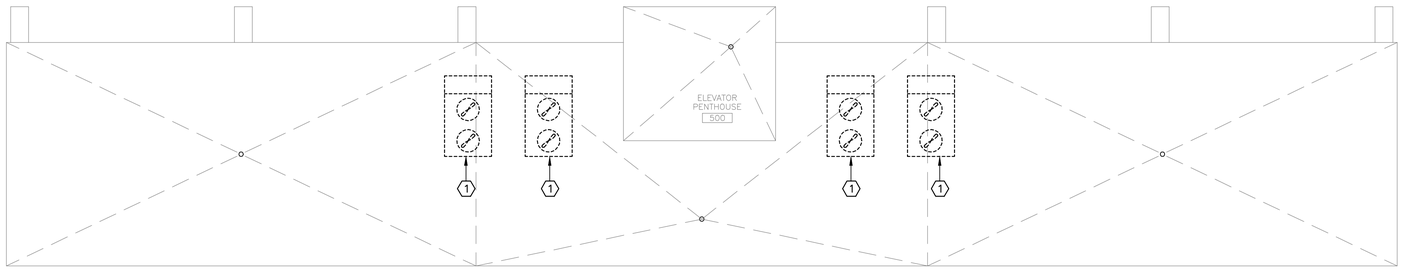
REVISIONS
1 :
2 :
3 :

JOB NO. 6339

DATE: MARCH 14, 2013

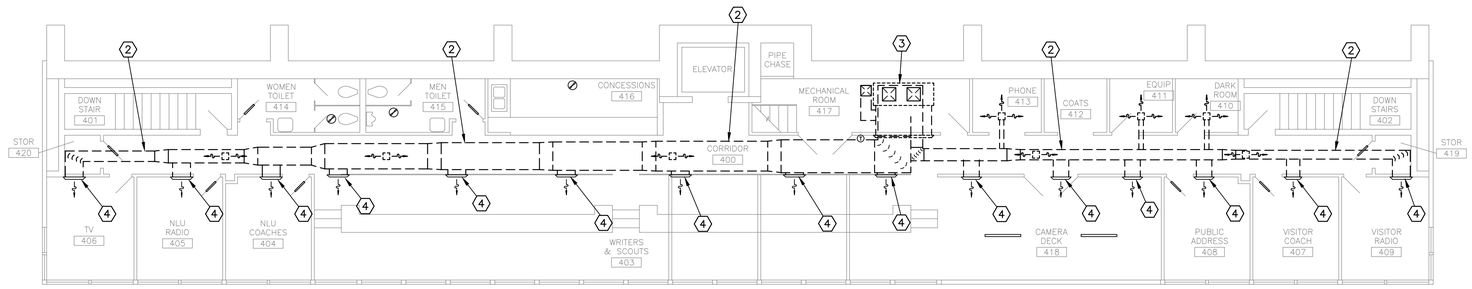
SHEET NO.
M-4
OF

DATE DRAWING LAST SAVED:03/14/13 TIME:10:28:29
DATE DRAWING LAST PLOTTED: 03/14/13 TIME:10:26:05



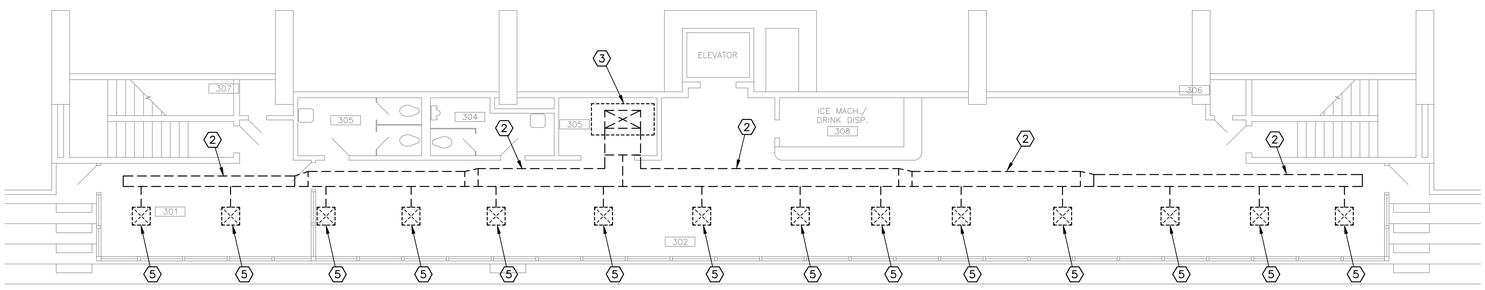
3 ROOF PLAN 1/8"=1'-0"
HVAC DEMOLITION

N



2 SECOND FLOOR PLAN 1/8"=1'-0"
HVAC DEMOLITION

N



1 FIRST FLOOR PLAN 1/8"=1'-0"
HVAC DEMOLITION

N

DEMOLITION NOTES BY SYMBOL:

1. REMOVE EXISTING CONDENSING UNIT AND RELATED REFRIGERANT PIPING, VALVES, WIRING AND CONTROLS.
2. REMOVE EXISTING DUCTWORK AND APPURTENANCES.
3. REMOVE EXISTING AIR HANDLER AND RELATED REFRIGERANT PIPING, WIRING AND CONTROLS.
4. EXISTING WALL SUPPLY AIR GRILLE TO REMAIN DISCONNECT FROM SUPPLY AIR MAIN DUCT.

12" 0" 5' 10' 15' 20' 25'
SCALE: 1/8 INCH = 1 FOOT

JOHN J. GUTH ASSOCIATES, INC.
MECHANICAL AND ELECTRICAL ENGINEERS
208 MILAM STREET SHREVEPORT, LOUISIANA 71101 FAX. 318-221-8717
TEL 318-221-8638

REPLACE PRESSBOX AND SKYBOX HVAC
MALONE STADIUM
UNIVERSITY OF LOUISIANA AT MONROE

REVISIONS
1 :
2 :
3 :

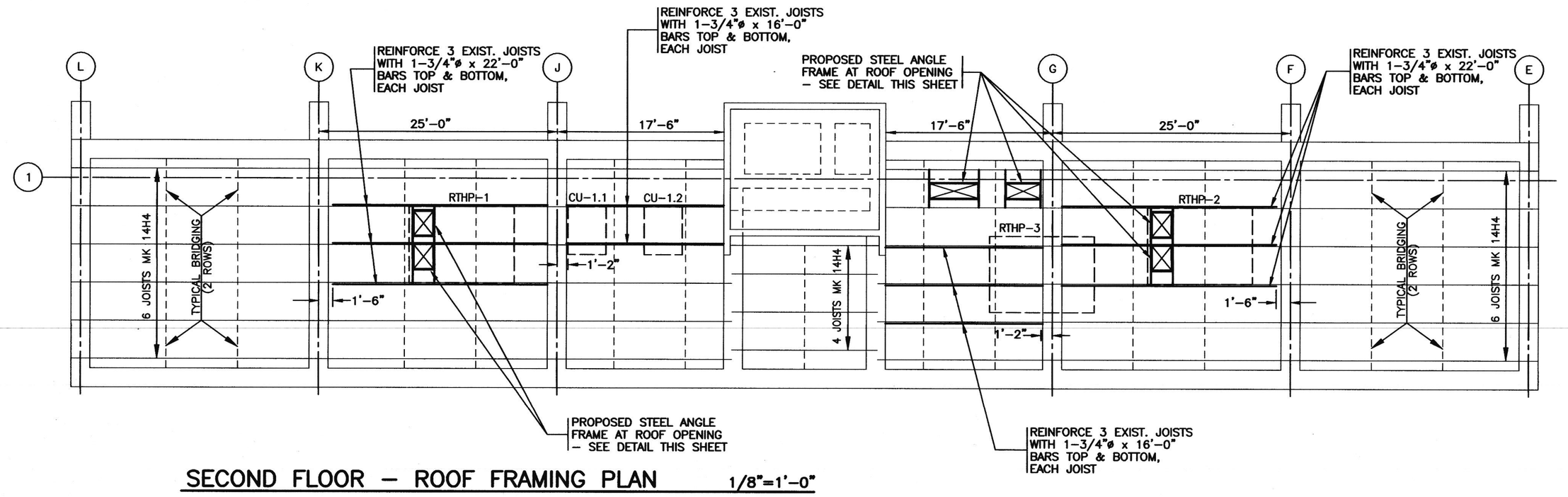
JOB NO. 6339
DATE: MARCH 14, 2013
SHEET NO.
MD1
OF

JOHN J. GUTH ASSOCIATES, INC.
CONSULTING MECHANICAL AND ELECTRICAL ENGINEERS
208 MILAM STREET SHREVEPORT, LOUISIANA 71101 6339
DESIGNER: MIKE BALUNA
CHECKED BY: JCW

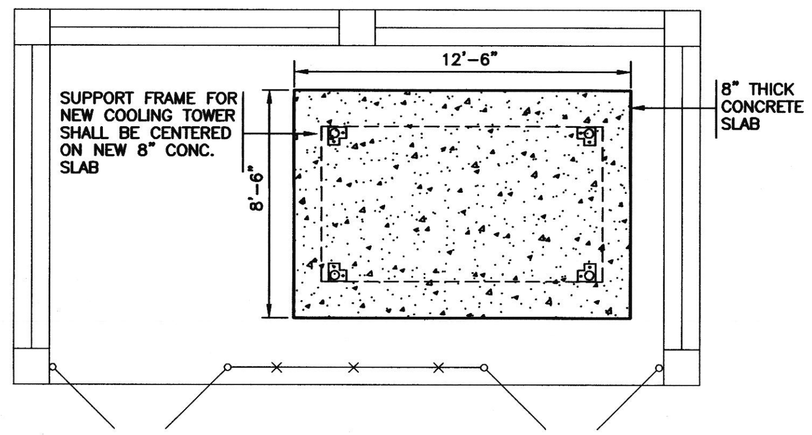
THESE DRAWINGS DO NOT INCLUDE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY.

STATE OF LOUISIANA JOHN C. WILSON REG. No. 19068 PROFESSIONAL ENGINEER IN MECHANICAL ENGINEERING 7/16/2013

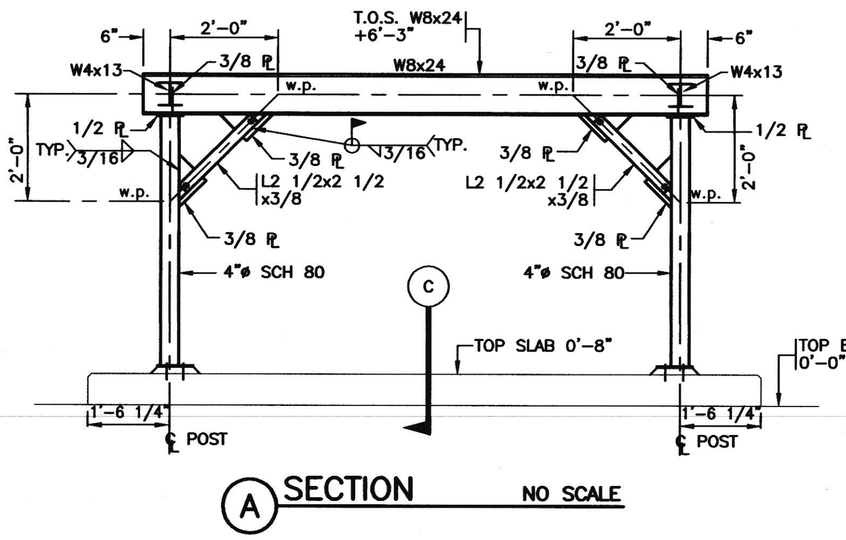
DATE DRAWING LAST SAVED: 02/25/13 TIME:11:35:09 DATE DRAWING LAST PLOTTED: 02/25/13 TIME:11:34:23



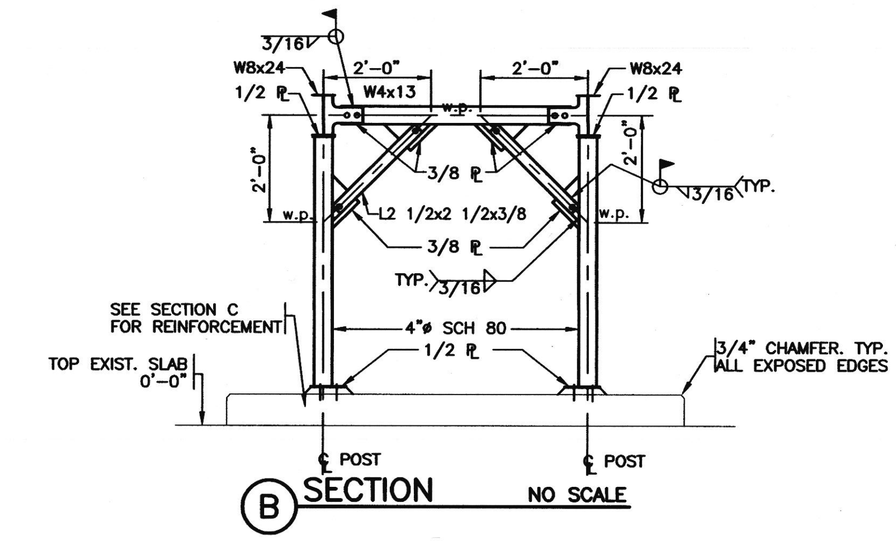
SECOND FLOOR – ROOF FRAMING PLAN 1/8"=1'-0"



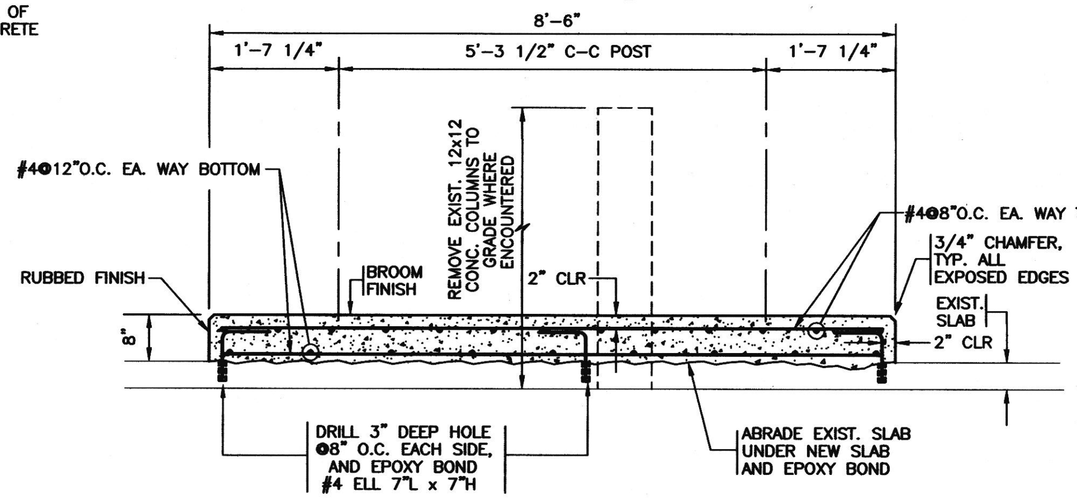
COOLING TOWER SLAB PLAN 1/4"=1'-0"



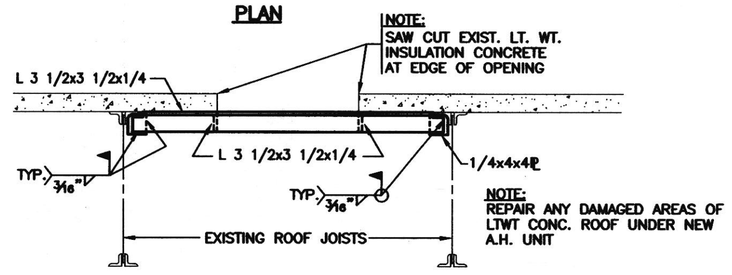
A SECTION NO SCALE



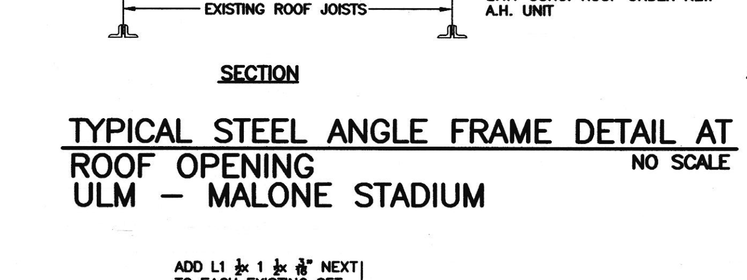
B SECTION NO SCALE



C SECTION NO SCALE

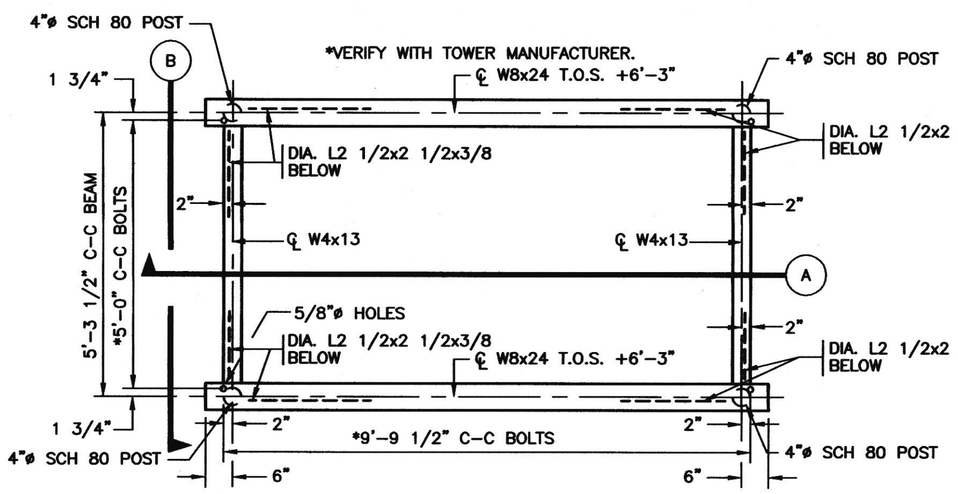


PLAN

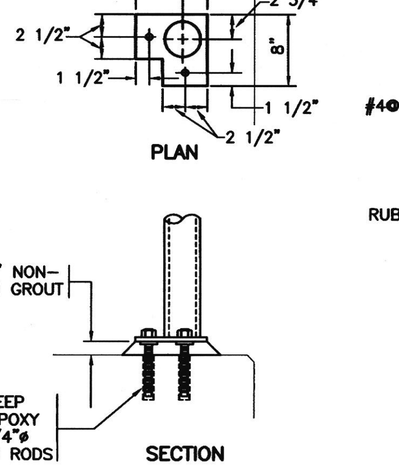


SECTION

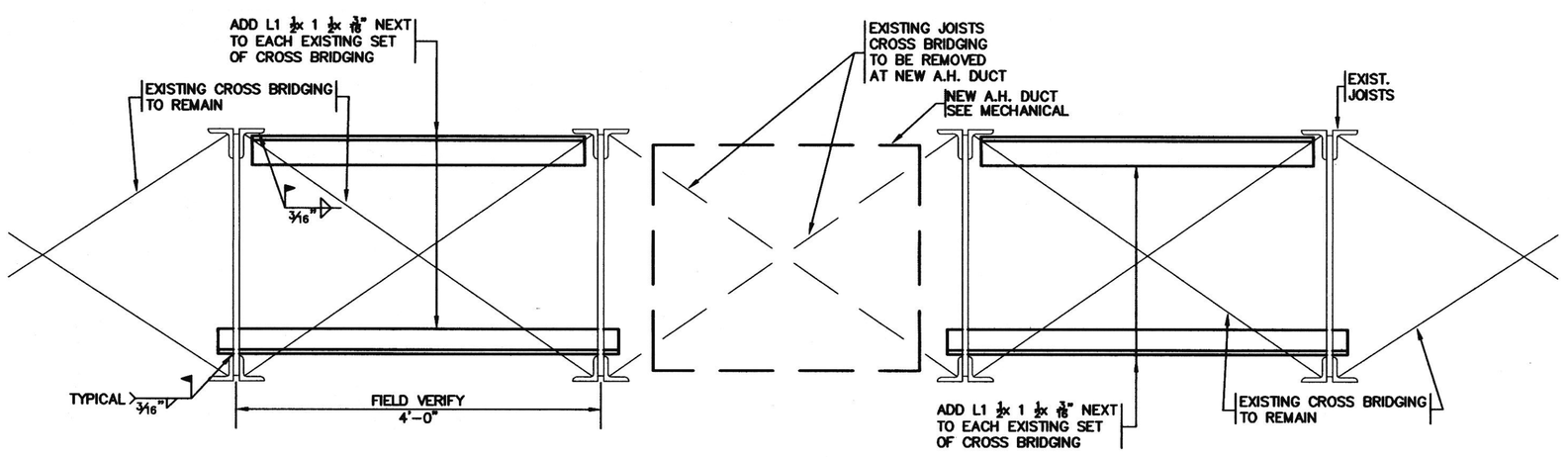
TYPICAL STEEL ANGLE FRAME DETAIL AT ROOF OPENING ULM – MALONE STADIUM NO SCALE



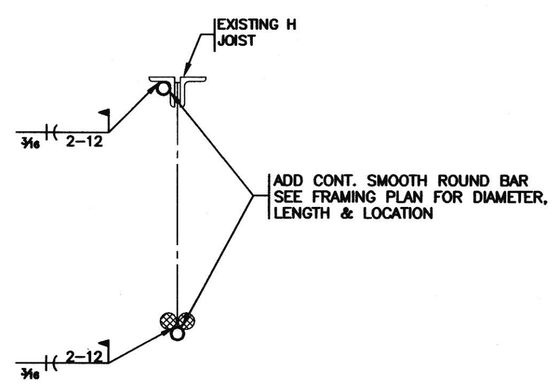
STEEL FRAMING PLAN FOR NEW COOLING TOWER NO SCALE



TYPICAL BASE PLATE DETAIL NO SCALE



JOIST BRIDGING REPLACEMENT DETAIL AT DUCTWORK CONFLICTS ULM – MALONE STADIUM NO SCALE



H JOIST REINFORCEMENT DETAIL NO SCALE

GENERAL NOTES:

1. ALL STEEL SHAPES AND PLATES SHALL BE ASTM A36 AND SHALL BE NEW. ALL INTERIOR STEEL SHALL RECEIVE SHOP PRIMER COAT OF PAINT. ALL EXPOSED STEEL SHALL BE GALVANIZED.
2. FIELD VERIFY LOCATION OF ALL SUPPORT MEMBERS AND DIMENSIONS INDICATED PRIOR TO DETAILING NEW STEEL.
3. ALL WELDING ELECTRODES SHALL BE E70XX.
4. ALL FIELD WELDS SHALL BE CONTINUOUS UNLESS NOTED OTHERWISE.
5. EDGES OF ROOF AND FLOOR SLAB OPENINGS SHALL BE SAW CUT.
6. CONTRACTOR SHALL PROVIDE ADEQUATE TEMPORARY COVER OVER ROOF OPENINGS DURING CONSTRUCTION.
7. EXISTING JOISTS SHALL BE LEFT IN PLACE. **CUTTING OF EXISTING JOISTS SHALL NOT BE PERMITTED.**
8. VERIFY THAT ALL EXISTING BRIDGING TO JOISTS SUPPORTING NEW UNITS IS SECURE PRIOR TO SETTING NEW UNITS.
9. ALL CONCRETE SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3000 PSI.
10. ALL REINFORCING STEEL SHALL CONFORM TO ASTM A615 GRADE 60.
11. EPOXY BONDER SHALL CONFORM TO ASTM C881.

JOHN J. GUTH ASSOCIATES, INC.
CONSULTING MECHANICAL AND ELECTRICAL ENGINEERS
208 MILAM STREET SHREVEPORT, LOUISIANA 71101 6339
DESIGNER: STEVEN M. HAZEN, P.E.
CHECKED BY:

THESE DRAWINGS DO NOT INCLUDE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY.

STATE OF LOUISIANA STEVEN M. HAZEN REG. NO. 29267 PROFESSIONAL ENGINEER 3-14-13 CIVIL ENGINEERING

JOHN J. GUTH ASSOCIATES, INC.
MECHANICAL AND ELECTRICAL ENGINEERS
208 MILAM STREET SHREVEPORT, LOUISIANA 71101
TEL. 318-221-8638 FAX. 318-221-8717

REPLACE PRESSBOX AND SKYBOX HVAC MALONE STADIUM
UNIVERSITY OF LOUISIANA AT MONROE

REVISIONS
1 .
2 .
3 .

JOB NO. 6339

DATE: MARCH 14, 2013

SHEET NO.
S1
OF

DATE DRAWING LAST PLOTTED: 03/05/13 TIME:09:29:43
DATE DRAWING LAST SAVED: 03/05/13 TIME:09:59:12